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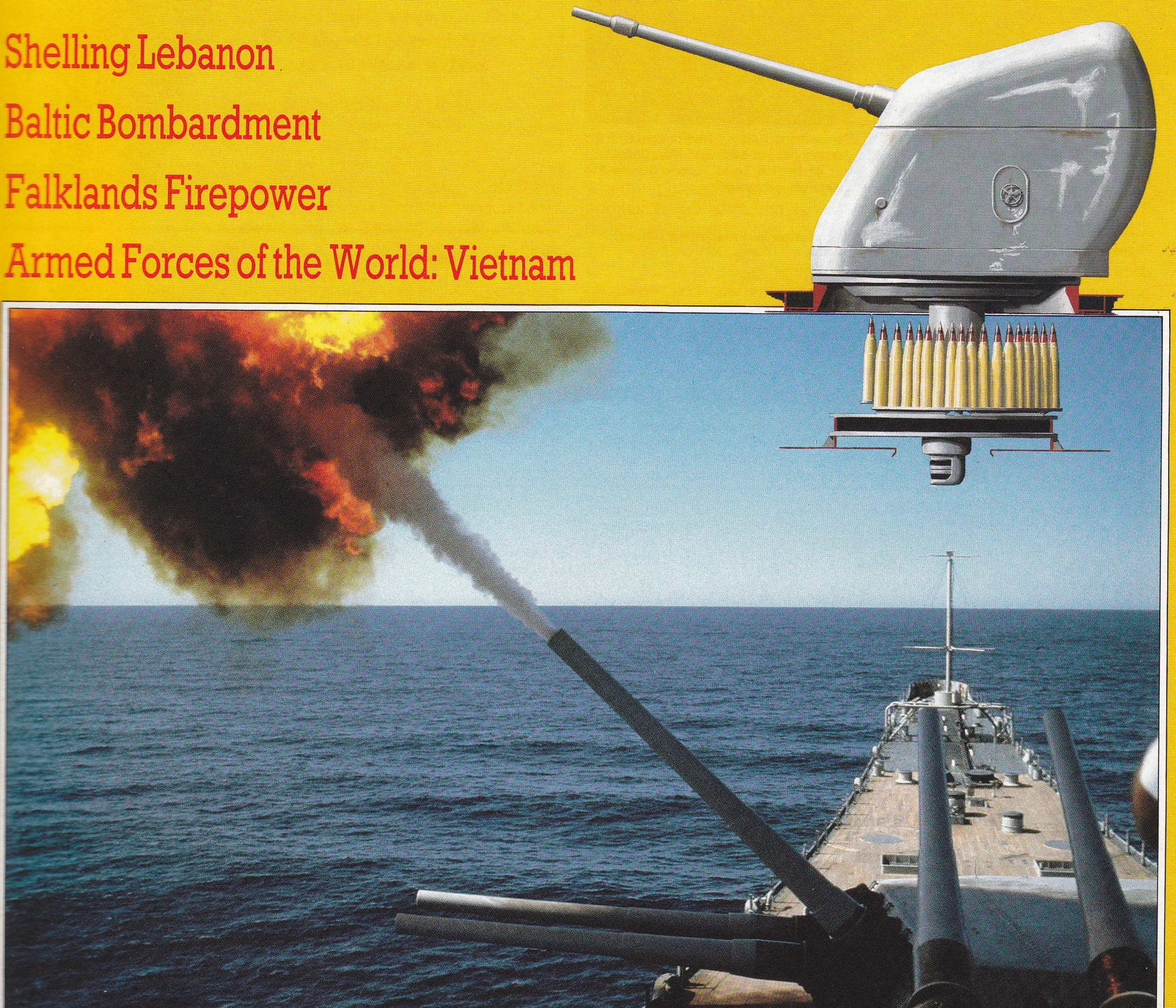

A fully illustrated guide to Modern Naval Artillery

WAR MACHINE

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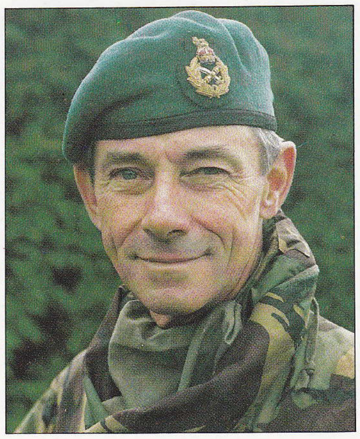

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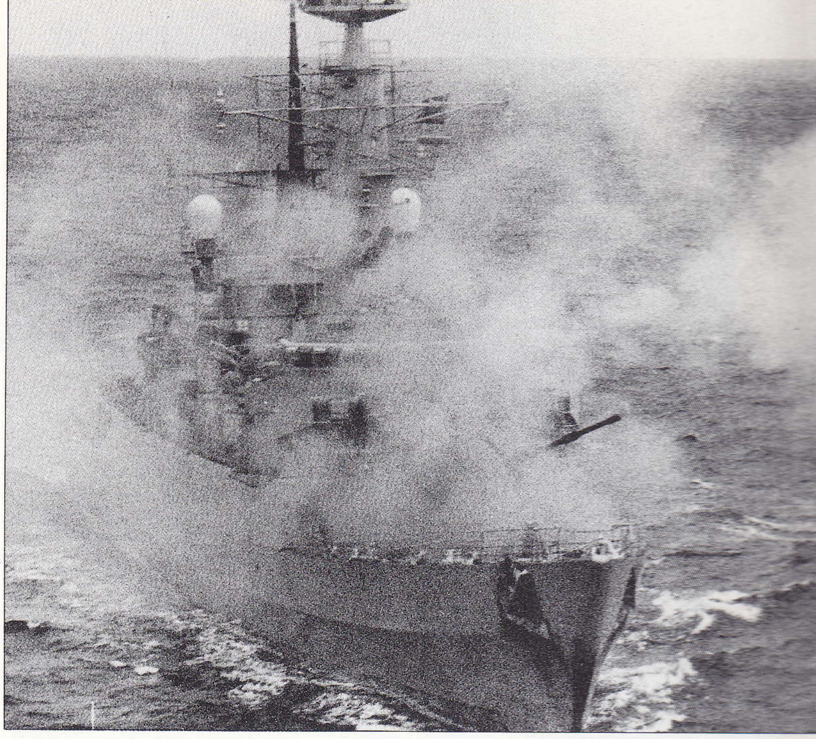
Modern Naval Artillery

The pre-eminence of the aircraft-carrier in the immediate post-war years and the rise of the guided missile seemed to signify the end of the naval gun as a major weapon system, but events of the last decade have shown the error of such a way of thinking and naval artillery has seen a revival.



The Royal Navy found itself unexpectedly in action in the South Atlantic in 1982, with the supposedly outdated medium naval gun making an important contribution to the campaign to retake the Falklands. The 'Type 21' frigate HMS Active *found herself on shore bombardment duty within days of arriving.*

Since the 1982 Falklands War and the troubles in Lebanon late in the following year, the terms Naval Gunfire Support (NGS) and Naval Gunfire Support Forward Observer (NGSFO) have begun to take on significant meanings in politico-military circles. In an age where defence money is difficult to find, it had become an easy option to say that a medium-calibre gun was obsolete aboard a naval warship which could be armed with longer-range 'all-singing, all-dancing' missile systems. Thus in the case of the Royal Navy it was decided that the new-generation 'Type 22 Batch 1/2/3' ASW frigates and the follow-on 'Type 23' class would no longer carry such a weapon. However, the Falklands War and the use to which such current naval guns were put forced a rapid rethink which has resulted in the 'Type 22 Batch 3' ships and the 'Type 23' or 'Duke' class being redesigned to incorporate the tried and trusted fully automatic 114-mm (4.5-in) Mk 8 gun.

It is interesting to contrast the original narrow-minded view of the British Ministry of Defence with its counterparts in the USSR and USA, which were then actively promoting the retention of big gun warships in their navies to perform NGS tasks amongst other things. Surprisingly, other European navies tended to follow the big powers' lead and tried wherever possible to keep large-calibre guns in their warships. In addition both France and Italy have made a lucrative export trade out of selling their guns to other nations throughout the world. Of the guns sold by these two countries the most important is the Italian 76-mm (3-in) OTO-Melara Compact, which is used by some 35 different navies and has been used in combat on many occasions by the Israeli navy in both the shore-bombardment and anti-surface ship roles. However, the most famous gun by far is the immense American 406-mm (16-in) weapon of the 'Iowa' class battleships, which again fired in anger for a third time since World War II during the US Navy's involvement in the Lebanese tragedy.

For most of the last four and a half centuries, the primary aim of naval gunfire has been the destruction of enemy ships. World War II saw a considerable change in role, with the massive guns of the battleship providing awesome support to amphibious landings, a task still much in evidence today.

100-mm Model 68-II gun

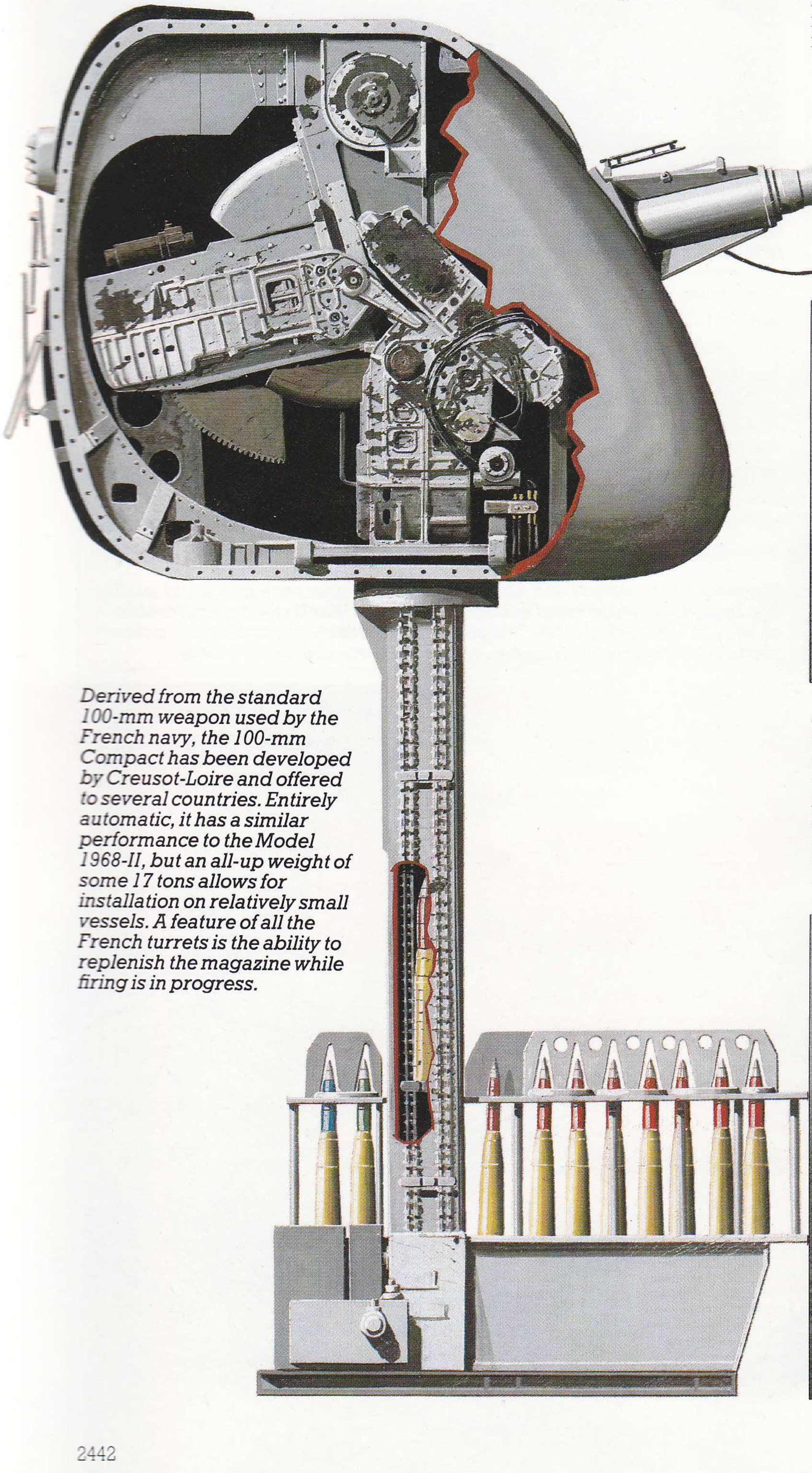
The 100-mm (3.9-in) **Model 1968-II** 55-calibre weapon is the latest version of a series of French 100-mm (3.94-in) guns which have the designations **Models 1953, 1964** and **1968-I**. Compared with these the Model 68-II is lighter and fully automatic, with the option of autonomous operation with a turret crew of only two. The barrel has a longer life than those of the previous guns because it is air-purged and water-cooled after each round has been fired. The gun can engage both air and surface targets, the former including sea-skimming anti-ship missiles. The round types fired include both a multi-purpose shell with either a time or proximity fuse, and a prefragmented shell with a proximity fuse. Apart from the French navy, the Model 1968-II or its earlier variants serve with the navies of Belgium, Portugal, Argentina and Greece.

A 100-mm **Creusot-Loire Compact** variant (entirely automatic and possessing the same performance characteristics) has also been developed and sold to Saudi Arabia, Malaysia and the People's Republic of China.

Specification

Model 1968-II
Calibre: 100 mm (3.94 in)
Weight: 22 tons
No. of barrels: one
Elevation: −15° to +80°
Muzzle velocity: 870 m (2,854 ft) per second
Projectile weight: 13.5 kg (29.8 lb)
Total round weight: 23.6 kg (52 lb)
Maximum rate of fire: 60 rpm
Maximum effective ranges: surface fire 15 km (9.3 miles), and anti-aircraft fire 8 km (5 miles)

Above: Admiral Charner, *a frigate of the 'Commandant Rivière' class, is fitted with the standard 100-mm gun turret fore and aft, although one of the aft turrets has been replaced by Exocet launchers.*



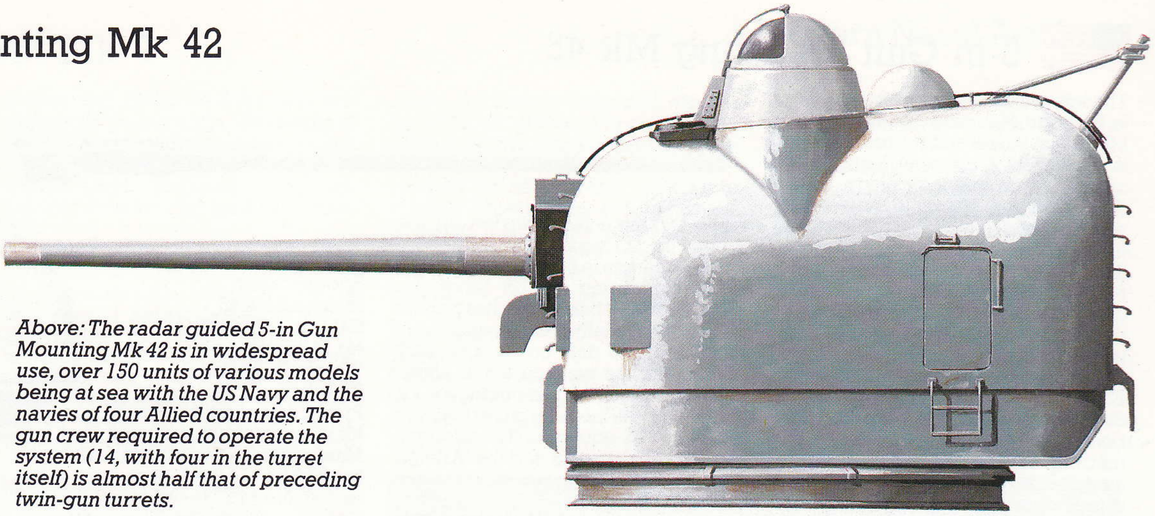
Derived from the standard 100-mm weapon used by the French navy, the 100-mm Compact has been developed by Creusot-Loire and offered to several countries. Entirely automatic, it has a similar performance to the Model 1968-II, but an all-up weight of some 17 tons allows for installation on relatively small vessels. A feature of all the French turrets is the ability to replenish the magazine while firing is in progress.

Above: The Mediterranean-based aviso (frigate) Quartier Maitre Anquetil *of the 'A69' class is equipped with a single 100-mm dual-purpose gun in the Model 1968-II mounting. This version of the turret is a lightened and completely automatic derivation of the Models 1953, 1964 and 1968-I.*

Below: Second Maitre Le Bihan, *based in the Channel, displays her bow-mounted 100-mm main armament. The gun has a rate of fire of 60 rounds per minute (which can be sustained) and is designed to engage both surface and aerial targets. Sea-skimming missiles can also be engaged.*

USA

5-in Gun Mounting Mk 42



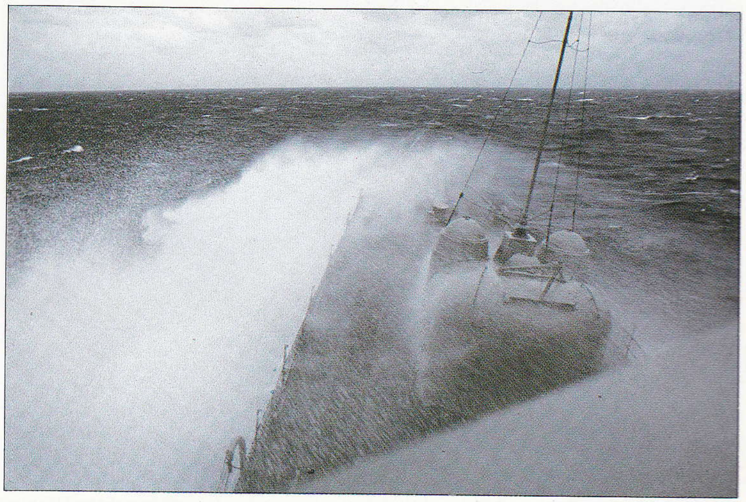
Above: The radar guided 5-in Gun Mounting Mk 42 is in widespread use, over 150 units of various models being at sea with the US Navy and the navies of four Allied countries. The gun crew required to operate the system (14, with four in the turret itself) is almost half that of preceding twin-gun turrets.

The dual-purpose radar-controlled single **5-in Gun Mounting Mk 42** was adopted in the late 1950s and early 1960s as the successor to the semi-automatic twin 127-mm (5-in) 38-calibre Mk 32 and single 127-mm 54-calibre Mk 39 mountings of World War II and the immediate post-war years respectively. The Mk 42 is capable of a much higher rate of fire and is fitted with an automatic ammunition feed system with two 20-round ready-use drums. Driven by electro-hydraulic power units, the Mk 42 can be operated in local or automatic control. Crew for the **Mk 42 Mod 7/8** is 14, of whom four are actually on the mount. Over 150 guns of this type are at sea with the US Navy and the navies of Australia, Japan, Spain and West Germany. All bar a few of the US guns have been upgraded to the **Mk 42 Mod 10** standard by kit additions, this bringing the mount up to the same equipment fit as the lighter **Mk 42 Mod 9** variant which was constructed for the 'Knox' class frigates. This has solid-state electronics, a 10 per cent reduction in power requirements and a crew of only two on the mount, reducing the overall total to 12. The 127-mm gun barrel fitted to the Mk 42 mounts is designated the Mk 18. A semi-active laser-guided projectile is in the procurement stage for these and the later Mk 45 mountings. The round is 1.548 m (5.08 ft) long, weighs 47.4 kg (104.5 lb), and is similar in concept to the US Army's Copperhead projectile for its 155-mm (6.1-in) howitzers.

Specification

Mounting Mk 42
Calibre: 127 mm (5 in)
No. of barrels: one
Weights: Mod 7/8 65.8 tons, Mod 9 57.65 tons and Mod 10 63.9 tons
Elevation: −5° to +80°
Muzzle velocity: 810 m (2,657 ft) per second
Projectile weight: 31.8 kg (70 lb)
Maximum rate of fire: 20 rpm
Maximum effective ranges: surface fire 23.8 km (14.8 miles), and anti-aircraft fire 14.8 km (9.2 miles)

Right: The single 5-in (127-mm) Mk 42 gun aboard a 'Forrest Sherman' class guided missile destroyer is engulfed by heavy seas. It should be remembered that naval guns have to function in all conditions.



The helicopter-carrying destroyer Shirane is armed with two single 5-in (127-mm) Mk 42 gun mountings. Altogether 11 vessels of the Japanese Maritime Self-Defence Force carry the Mk 42, with two more planned.

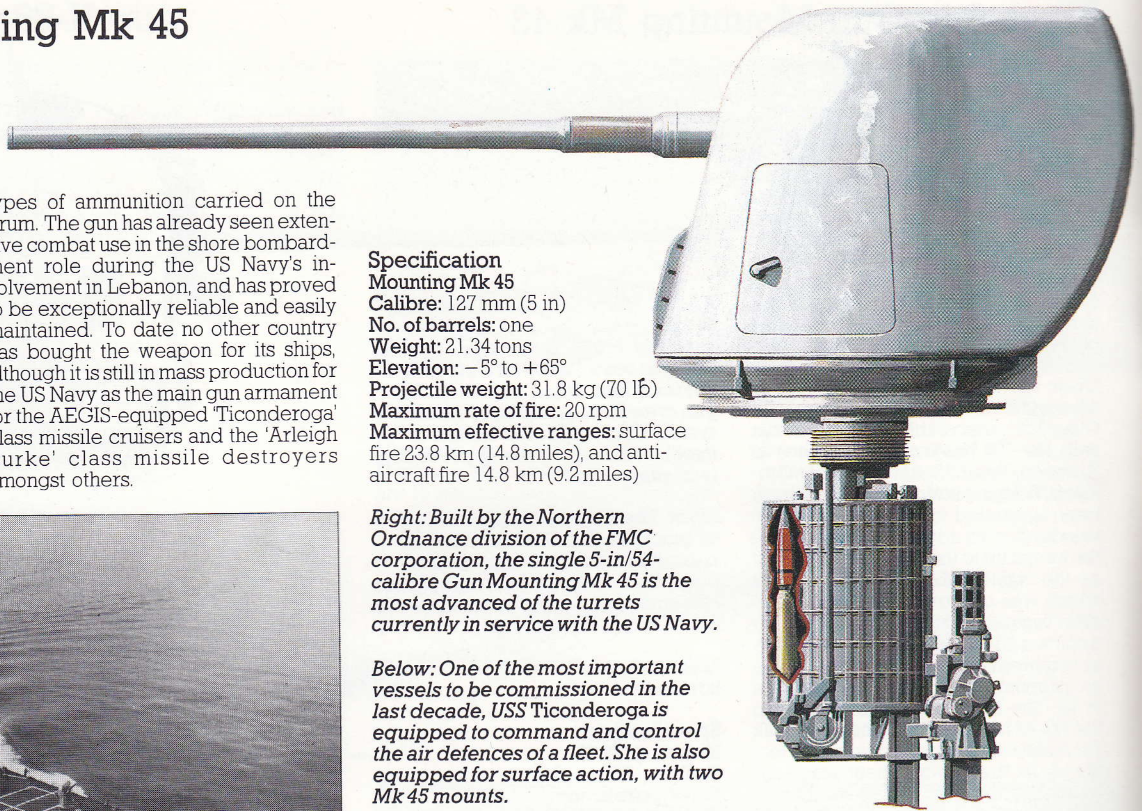
USA

5-in Gun Mounting Mk 45

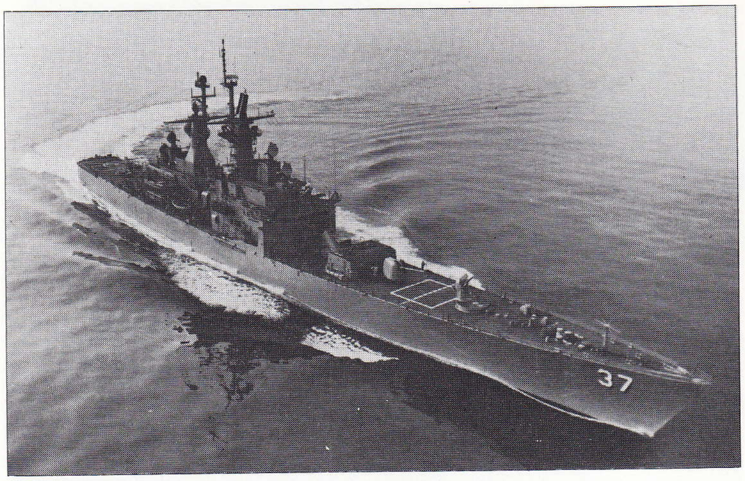
The lightweight radar-controlled single **5-in Gun Mounting Mk 45** utilizes a Mk 19 gun barrel and represents what is essentially a quantum leap for US naval medium gun technology. It was designed for fitting to new-build warships and is fully automatic in operation, with only six men required in the fixed-ammunition handling room to reload the single 20-round ready-use drum. The mount embodies all the improvements to 127-mm (5-in) gun mounts that have been developed over the last 40 years or so since the 127-mm 38-calibre gun was first introduced. In the **Mk 45 Mod 1** version now being produced the below-decks reloading arrangements have been modified to allow remote and rapid round selection between several types of ammunition carried on the drum. The gun has already seen extensive combat use in the shore bombardment role during the US Navy's involvement in Lebanon, and has proved to be exceptionally reliable and easily maintained. To date no other country has bought the weapon for its ships, although it is still in mass production for the US Navy as the main gun armament for the AEGIS-equipped 'Ticonderoga' class missile cruisers and the 'Arleigh Burke' class missile destroyers amongst others.

Specification

Mounting Mk 45
Calibre: 127 mm (5 in)
No. of barrels: one
Weight: 21.34 tons
Elevation: −5° to +65°
Projectile weight: 31.8 kg (70 lb)
Maximum rate of fire: 20 rpm
Maximum effective ranges: surface fire 23.8 km (14.8 miles), and anti-aircraft fire 14.8 km (9.2 miles)



Right: Built by the Northern Ordnance division of the FMC corporation, the single 5-in/54-calibre Gun Mounting Mk 45 is the most advanced of the turrets currently in service with the US Navy.



Above: The lean form of the 'California' class cruiser USS South Carolina *cuts through the water. In common with all of the larger fighting ships of the US Navy built in the last 10 years, the 'Californias' are armed with Mk 45s, which may soon be capable of firing laser guided projectiles.*

Above: USS Texas *of the 'Virginia' class is amongst the most potent cruisers afloat. With weaponry that includes Tomahawk, Harpoon, ASROC and Standard missiles, together with gun systems including Phalanx CIWS and two Mk 45 5-in (127-mm), the class has anti-air, anti-surface, and anti-submarine capability in no small measure.*

Below: One of the most important vessels to be commissioned in the last decade, USS Ticonderoga *is equipped to command and control the air defences of a fleet. She is also equipped for surface action, with two Mk 45 mounts.*

USA

16-in Gun Turret Mk 7

Following the reactivation of the 'Iowa' class battleships the US Navy reintroduced to active service the largest-calibre naval guns in the world today. With nine radar directed **16-in Mk 7 Mod 0** guns in three 1,708-ton triple turrets, the 'Iowas' require a crew of 77 per mount alone plus an additional 30-36 men in the magazines. The ammunition fired is either High-Capacity High Explosive (HCHE) or Armour-Piercing (AP), the latter being capable of penetrating up to 9 m (29.5 ft) of reinforced concrete or 559 mm (22 in) of armour plate. Each battleship has a magazine load of 1,220 projectiles with a larger number of 49.9-kg (110-lb) full-charge and 24-kg (52.8-lb) reduced-charge propellant bags. The length of each gun is 50 calibres, and the weight 108479 kg (239,156 lb) without its breech block. The guns can also be loaded, elevated and fired individually.

Since reactivation the USS *New Jersey* has used her guns in support of the Lebanese army and US Marines in and around Beirut, Lebanon, whilst during her previous Vietnam War activation the 406-mm gun proved one of the most accurate and deadly bombardment weapons of the whole war, hitting targets in direct support of ground troops and others which were inland and heavily defended with respect to air attack. During the late 1950s a tactical nuclear round, the 15-kiloton yield Mk 23 'Katie', was developed for service and, although a number entered the active nuclear stockpile, it is thought that none were taken to sea. The 'Iowa's were equipped to carry 10 of these rounds in their magazines.

Specification

Turret Mk 7

Calibre: 406 mm (16 in)

No. of barrels: three

Weight: 1,708 tons

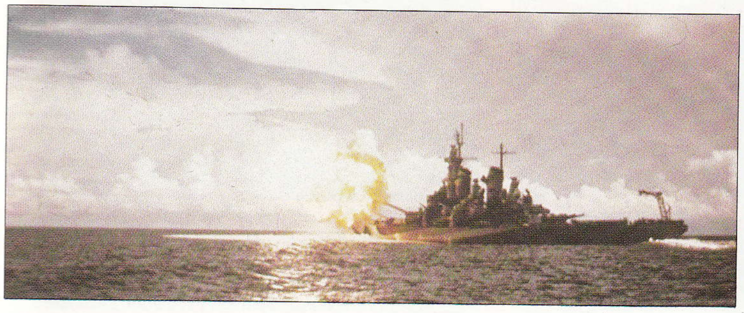
Elevation: −5° to +45°

Muzzle velocity: HCHE 762 m (2,500 ft) per second, and AP 579 m (1,900 ft) per second

Projectile weights: HCHE 862 kg (1,900 lb), and AP 1225 kg (2,700 lb)

Maximum rate of fire: 6 rpm

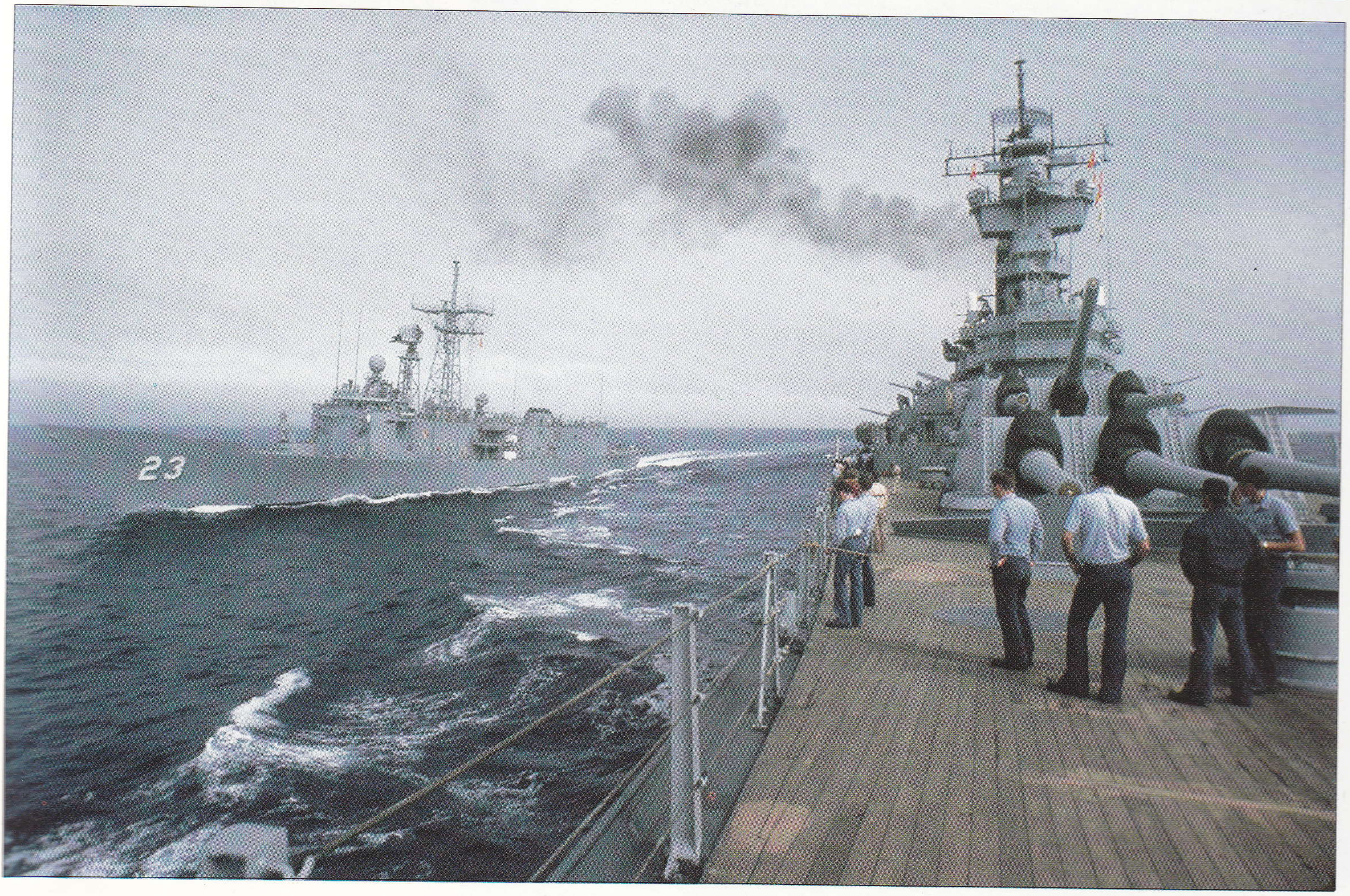
Maximum effective ranges: HCHE 38 km (23.6 miles), and AP 36.7 km (22.8 miles)



Above: The most heavily-armoured US warships ever built, the 'Iowa' class was designed to withstand combat with the Japanese superbattleships Yamato *and* Musashi. *The main armament was also the most powerful available, in triple Mk 7 turrets.*

The need for powerful shore bombardment saw the re-activation of the class in both the Korean and Vietnam wars. New Jersey *in 1968 was seen primarily as a gun platform, her 16-in (406-mm) guns being the only weapons manned.*

Below: The most recent activation has seen the 'Iowas' comprehensively refitted, and serving at the centre of surface action groups. The enormous main turrets are without parallel in today's navies, each barrel alone weighing over 100 tons.



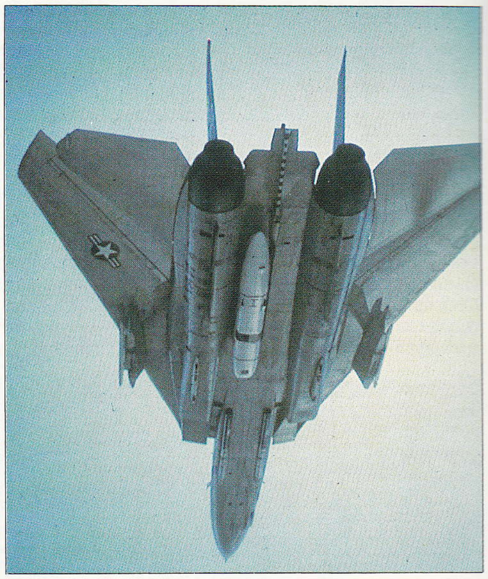
Shelling Lebanon

***The involvement of United States Marines with the Multinational Peacekeeping Force in the Lebanon saw the full weight of American military might supporting the contingent ashore. In addition to the carrier and amphibious groups offshore, the US Navy was to deploy the world's only operational battleship, the USS* New Jersey.**

In October 1982, following the Israeli 'Peace for Galilee' invasion of southern Lebanon and the subsequent siege of Beirut, a multi-national peacekeeping force (comprising US Marines, French paratroops and Foreign Legionnaires, Italian army units and a small armoured car unit of the British army's Blues and Royals) was landed in an effort to keep the peace between an apparent myriad warring factions. Meanwhile in the Shouf mountains to the south east of the city Christian Phalangist and Moslem Druse militias began a savage blood feud which caught the Israelis right in the middle. They endured this for nearly a year until they withdrew from Beirut and its surroundings. This left the Christians who had moved into the Shouf without any effective support as the Lebanese army (reformed, rearmed and trained by the Americans) was still not strong enough to take over the abandoned Israeli positions. The Druse forces at once mounted an all-out attack on both the Phalangist villages and the main Lebanese army position at Souk al-Gharb. They succeeded in eliminating the former whilst the Lebanese army held on grimly to its positions using every unit and weapon available.

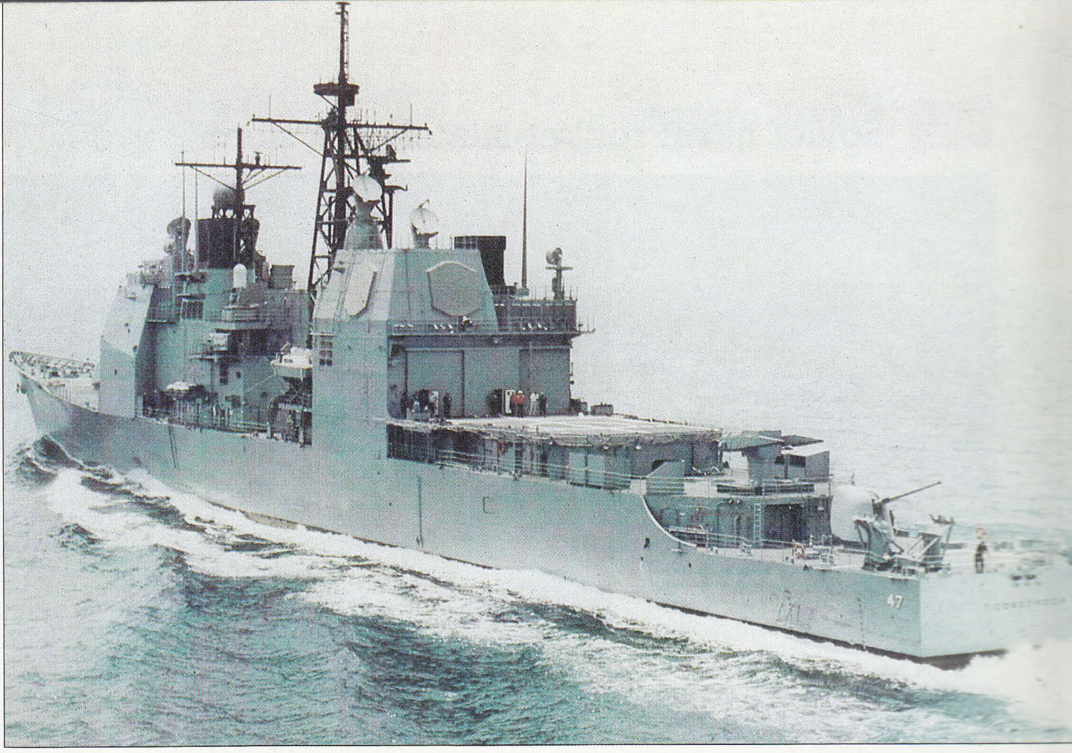
Fearing a major increase in the threat to the peacekeeping force, the Americans committed a number of its missile cruisers and destroyers offshore to supporting the Lebanese with 127-mm (5-in) Naval Gunfire Support (NGS). Using a mixture of both aerial reconnaissance by TARPS-equipped Grumman F-14A Tomcats from carriers, and small three/four-man US Marine Corps forward observer teams which entered the Shouf in jeeps and Lebanese army vehicles to find suitable targets, hundreds of rounds were fired into Druse positions to prevent a final assault on Souk al-Gharb. Although in the final analysis the American NGS caused little in the way of military damage or casualties, the deterrent value was sufficient. On 25 October the suicide bombings of the US Marine Corps and French paratroop HQs during Muharram, the first month of the Moslem year and what is effectively the martyrdom season for fanatic Shia Moslems caused American resolve to strengthen: the massive 406-mm (16-in) guns of the battleship USS *New Jersey* lying off shore were allowed to open fire for the first time on 14 December.

Used to bombard Druse and Syrian positions in the Shouf the *New Jersey* fired huge 862-kg (1,900-lb) HE rounds that in some areas literally reshaped the landscape. Although impressive in appearance, with complete salvoes being fired off at targets many kilometres inland, the final results showed a need for more effective rounds to produce a better target coverage. A programme was then initiated to develop both



Accurate gunfire from afloat needs identification of targets ashore. Grumman F-14A Tomcats, equipped with the Tactical Airborne Reconnaissance Pod System (TARPS), provided target information for the destroyers and cruisers giving the initial 127-mm (5-in) gunfire support for the Lebanese army.

Before long, attacks on the Marine contingent at Beirut airport led to the assignment of the massive firepower of USS New Jersey *to the Lebanon, where her guns were to be fired in anger for the first time in 16 years. The main targets were Syrian and Druze positions in the Shouf Mountains.*



The newest and most advanced warship in the US fleet saw action for the first time off the Lebanon, when on a number of occasions the AEGIS cruiser USS Ticonderoga *provided 127-mm (5-in) gunfire support to the troops ashore.*

submunition cargo rounds and an extended-range HE shell for engaging targets farther inland than ever before.

Although the 127-mm HE rounds were found adequate for some tasks, it was also deemed necessary that for the NGS of troops in close proximity to an enemy (as at Souk al-Gharb) a laser-guided round was needed, whilst for area targets well away from the coast rocket-assisted projectiles were required. The latter is now in service with the Mk 45 gun mount, whilst mass production of the former together with its shipboard Seafire laser fire-control system has been requested in the Fiscal Year 1986 military budget requests. The guided round will also be able to use ground-based laser designator systems currently in service with the US Marine Corps and airborne systems on forward observer aircraft. So the concept of picking off individual sniper and machine-gun positions with a 127-mm shell, which was so badly needed by the US Marines in Beirut during the latter period of their stay in the city, is not that far off and will add considerably to the US Marines' peacekeeping abilities in such situations.

The *New Jersey* and the other warships provided continuous NGS to the US Marines and Lebanese army until the former pulled out (or to give the correct US Administration term 're-deployed') on 22 February 1984. Although the US ground forces had failed in their primary mission and lost over 250 dead, the Lebanese operation again showed to the military world the value of having NGS available to ground forces, both in a direct support role and as a deterrent factor to effect operations on the field of battle. The use of the 406-mm guns in an unlimited manner on Druse villages and military positions in the Shouf would have caused even an organization hardened by years of brutal factional fighting unacceptable *matériel* and personnel losses. Thus the threat of the guns was sufficient to maintain a status quo around Souk al-Gharb in the military operations.

Above: Naval gunfire support can only be effective when there is accurate observation of the fall of shot. To that end, Marine Corps observer teams in jeeps entered the Shouf, both to find suitable targets and to correct naval shellfire.

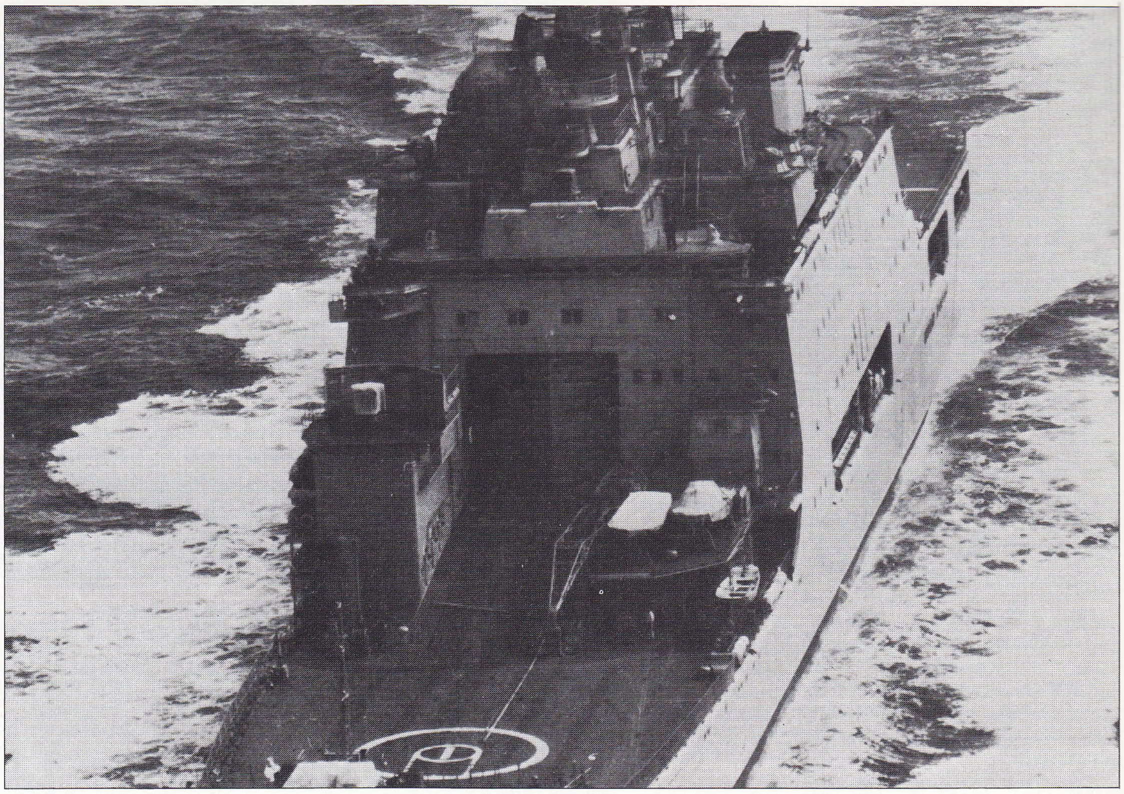
Right: Undoubtedly it was the use of New Jersey's *massive armament which drew all eyes to the Lebanon, but it should be remembered that only a few days previously this epitome of power projection was cruising the coast of Central America.*

USSR

Soviet naval rocket-launcher systems

For shore bombardment and defence suppression missions the Soviet navy has fitted some of its amphibious warfare vessels with modified versions of standard Soviet army multiple rocket-launcher systems. The oldest type used is an 18-tube 140-mm (5.51-in) launcher which is fitted amidships with blast shields in pairs on the 'Polnochny A/B/C' LSM classes. The rocket used is the spin-stabilized MF-14-0F, which weighs 39.6 kg (87.3 lb) and has an 18.8-kg (41.4-lb) HE-fragmentation warhead. The maximum range of the weapon is around 10 km (6.2 miles). It is believed that a smoke round can also be fired to screen an assault landing. The weapon has been exported aboard 'Polnochnys' to the navies of Algeria, Angola, Cuba, Egypt, Ethiopia, India, Iraq, Libya, Poland, Somalia, South Yemen, Syria and Vietnam.

In the late 1970s the Soviets introduced a new rocket-launcher aboard the 'Ivan Rogov' class LPD and the 'Alligator IV' class LST. Based on the 122-mm (4.8-in) BM-21, the naval system comprises a pedestal mount with two clusters of 20 loaded rocket tubes. Once fired, the empty tubes are discarded and the mount is automatically reloaded with two new pods from a below-deck magazine. Several of the East German's 'Frosch' class LSTs are also configured for this system. The standard rocket weighs some 77 kg (169.75 lb) and has a 19.4-kg (42.8-lb) HE-fragmentation warhead. Smoke and chemical rounds are available as options. The maximum range of the system is in the region of 20 km (12.4 miles), which allows the vessel to stand-off a fair distance to avoid return fire. In both cases the systems used can be fired individually, in multiples or complete salvoes.



Specification

122-mm launcher
Calibre: 122 mm (4.8 in)
No. of launcher tubes: 40 (two 20-round pods)
Weight of rocket: 77 kg (169.8 lb)
Types of rockets: HE, smoke, chemical
Reload time: 2-3 minutes
Maximum range: 20 km (12.4 miles)

Specification

140-mm launcher
Calibre: 140 mm (5.51 in)
No. of launcher tubes: 18
Weight of rocket: 39.6 kg (87.3 lb)
Types of rockets: HE, smoke
Reload time: 10 minutes
Maximum range: 10 km (6.2 miles)

Given previous Soviet practice in adapting naval systems for land use or vice versa, it should not be surprising to learn that the famous 'Katyusha' multiple rocket-launcher should appear on Soviet assault ships. On the* Ivan Rogov*, the rockets are pedestal-mounted high in front of the bridge.

USSR

76-mm guns

In the early 1960s the Soviet navy introduced into service on the 'Kynda' class missile cruisers a twin 76-mm 60-calibre rapid-firing dual-purpose gun mount which rapidly became the standard fit for a number of warship and auxiliary vessel classes. Now found on the 'Kiev' class aircraft-carriers, the 'Kara' and 'Kyunda' class missile cruisers, the 'Kashin' and 'Kildin' class destroyers, the 'Krivak I', 'Mirka' and 'Petya' class frigates and the 'Ivan Rogov' class amphibious warfare ships, the mount is usually associated with either an 'Owl Screech' or 'Hawk Screech' I-band fire-control radar. The system has also been exported to a number of Soviet client states on export version 'Kashin' class destroyers and 'Petya' and 'Koni' class frigates.

For smaller surface combatants such as the 'Matka' class missile craft and the 'Tarantul', 'Nanuchka III' and 'Pauk' class corvettes, the Soviets introduced in the 1970s a fully automatic single 76-mm 60-calibre dual-purpose gun which also had the option of local

The 76-mm Dual Purpose gun fitted to the rear of the superstructure of the Soviet carrier 'Kiev' is seen in the anti-aircraft position in this picture taken in the Mediterranean by a Royal Air Force Nimrod maritime patrol aircraft.

on-mount control by a gun crew if required. Fire-control for aerial targets is by a 'Bass Tilt' H-band radar, whilst surface targets need the use of a local sighting system in conjunction with the ship's search radar.

Specification

76-mm L/60
Calibre: 76 mm (3 in)
No. of barrels: two
Elevation: 0° to +80°
Muzzle velocity: 900 m (2,953 ft) per second
Projectile weight: 16 kg (35.3 lb)
Maximum rate of fire: 90 rpm
Maximum effective ranges: surface fire 8 km (5 miles), and anti-aircraft fire 6 km (3.7 miles)

Specification

76-mm L/60
Calibre: 76 mm (3 in)
No. of barrels: one
Elevation: −5° to +85°
Muzzle velocity: 900 m (2,953 ft) per second
Projectile weight: 16 kg (35.3 lb)
Maximum rate of fire: 120 rpm
Maximum effective ranges: surface fire 10 km (6.2 miles), and anti-aircraft fire 7 km (4.3 miles)

First appearing on 'Kynda' class cruisers in the early 1960s, the twin 76-mm DP gun also appeared on the contemporary 'Kashin' class destroyers. Classes since carrying it include 'Kiev', 'Kara' and 'Krivak'.

USSR

100-mm and 130-mm guns

In the early 1970s the 'Krivak II' class missile frigates were seen to be armed with two new-pattern single 70-calibre 100-mm dual-purpose gun mounts aft. The barrel is water-cooled and the mounting is assessed by NATO as being fully automatic in operation, with fire-control by either a 'Kite Screech' radar or an off-mount optronic sighting system. The new gun was subsequently seen to be adopted for the 'Udaloy' class ASW destroyers, the 'Krivak III' class missile frigates and the lead ship of the nuclear-powered battlecruisers, the *Kirov* herself.

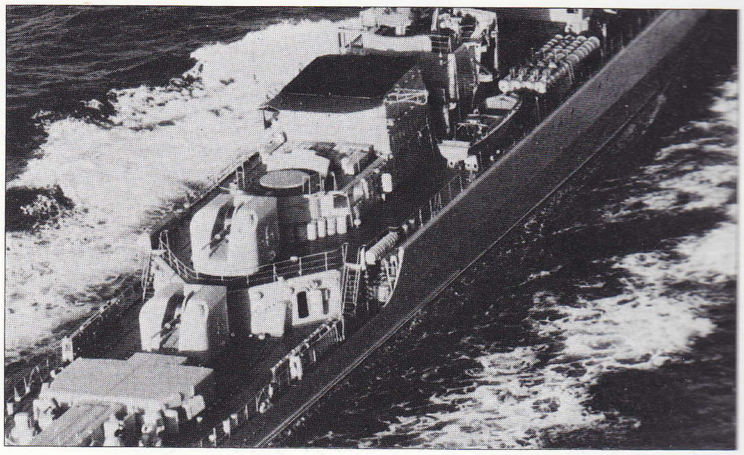
The 100-mm (3.9-in) gun was followed in the mid-1970s by a brand new gun design mounted initially on the 'Sovremenny' destroyer class, and found to be a 70-calibre twin 130-mm dual-purpose gun mount. The barrels are also water-cooled to prolong life. The fitting of the barrels close together would seem to indicate that they share a common cradle system. The guns have a greater maximum range than the older 152-mm (6-in) Soviet guns (28 km/17.4 miles in comparison with 27 km/16.8 miles), and are now fitted as the main armament for the larger Soviet surface combatants such as the 'Slava' class missile cruisers and the second nuclear-powered battlecruiser, the *Frunze*. Fire-control is similar to that of the smaller 100-mm gun.

Specification

100-mm L/70
Calibre: 100 mm (3.94 in)
No. of barrels: one
Elevation: −5° to +80°
Muzzle velocity: 900 m (2,953 ft) per second
Maximum rate of fire: 80 rpm
Maximum effective ranges: surface fire 15 km (9.3 miles), and anti-aircraft fire 8 km (5 miles)

Specification

130-mm L/70
Calibre: 130 mm (5.12 in)
No. of barrels: two
Elevation: −5° to +80°
Muzzle velocity: 950 m (3,117 ft) per second
Maximum rate of fire: 130 rpm
Maximum effective ranges: surface fire 18 km (11.2 miles), and anti-aircraft fire 10 km (6.2 miles)



***Above: Unlike earlier Soviet 100-mm guns, the new weapon that has appeared on later versions of the 'Krivak' class frigate is almost certainly fully automatic. The only other vessels so far thus equipped are the battlecruiser* Kirov *and the large ASW destroyer* Udaloy.**

Below: The powerful surface warfare armament of the 'Sovremenny' class destroyers is enhanced by the fitting of two twin 130-mm (5.12-in) automatic gun turrets. Also fitted to 'Slava' class cruisers, the weapon outranges the old 152-mm (6-in) gun aboard the 'Sverdlovs'.

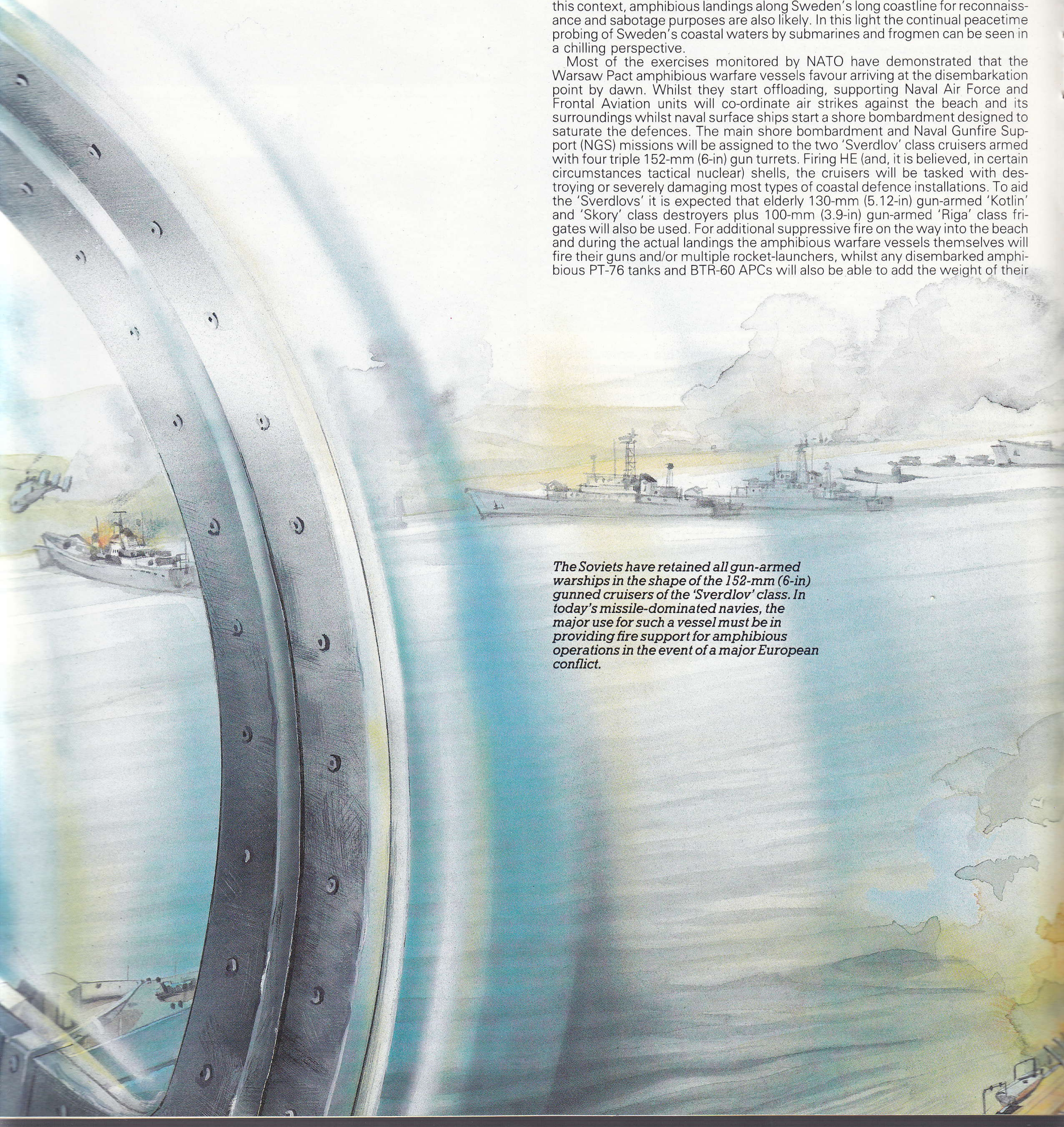
Baltic Bombardment

Soviet experience in the Baltic during the 'Great Patriotic War' showed the value of small-scale harassing amphibious operations. Since then, larger-scale action has been an increasingly important feature in Warsaw Pact exercises, and in the event of a Central Front conflict a Soviet flanking attack in the Baltic would be a very real threat.

In any future conflict between NATO and the Warsaw Pact, the latter will in all probability launch into action in the Baltic Sea a combined amphibious force of the Soviets' Baltic Fleet Naval Infantry Brigade, the East German army's 28th 'Wilhelm Florin' and 29th 'Ernst Moritz Arndt' Motorized Rifle Regiments and the Polish army's 7th Blue Beret Sea Landing Division to support the land theatre offensives. Amphibious assaults will probably include attempts to seize ports such as Kiel, to capture the Kiel Canal and, as the main strategic operation, to take the Danish Straits to prevent entry into the Baltic by US/NATO naval units and to allow free exit for Warsaw Pact/Soviet naval units to interdict the North Sea and the Channel. All three of the Warsaw Pact members regularly conduct both individual and combined force landing exercises during the year.

It is also thought likely that at the onset of any war the USSR will invade Sweden with airborne and ground forces across their common frontier. Within this context, amphibious landings along Sweden's long coastline for reconnaissance and sabotage purposes are also likely. In this light the continual peacetime probing of Sweden's coastal waters by submarines and frogmen can be seen in a chilling perspective.

Most of the exercises monitored by NATO have demonstrated that the Warsaw Pact amphibious warfare vessels favour arriving at the disembarkation point by dawn. Whilst they start offloading, supporting Naval Air Force and Frontal Aviation units will co-ordinate air strikes against the beach and its surroundings whilst naval surface ships start a shore bombardment designed to saturate the defences. The main shore bombardment and Naval Gunfire Support (NGS) missions will be assigned to the two 'Sverdlov' class cruisers armed with four triple 152-mm (6-in) gun turrets. Firing HE (and, it is believed, in certain circumstances tactical nuclear) shells, the cruisers will be tasked with destroying or severely damaging most types of coastal defence installations. To aid the 'Sverdlovs' it is expected that elderly 130-mm (5.12-in) gun-armed 'Kotlin' and 'Skory' class destroyers plus 100-mm (3.9-in) gun-armed 'Riga' class frigates will also be used. For additional suppressive fire on the way into the beach and during the actual landings the amphibious warfare vessels themselves will fire their guns and/or multiple rocket-launchers, whilst any disembarked amphibious PT-76 tanks and BTR-60 APCs will also be able to add the weight of their



The Soviets have retained all gun-armed warships in the shape of the 152-mm (6-in) gunned cruisers of the 'Sverdlov' class. In today's missile-dominated navies, the major use for such a vessel must be in providing fire support for amphibious operations in the event of a major European conflict.

guns as they are trained in co-ordinating counter fire whilst making an assault landing.

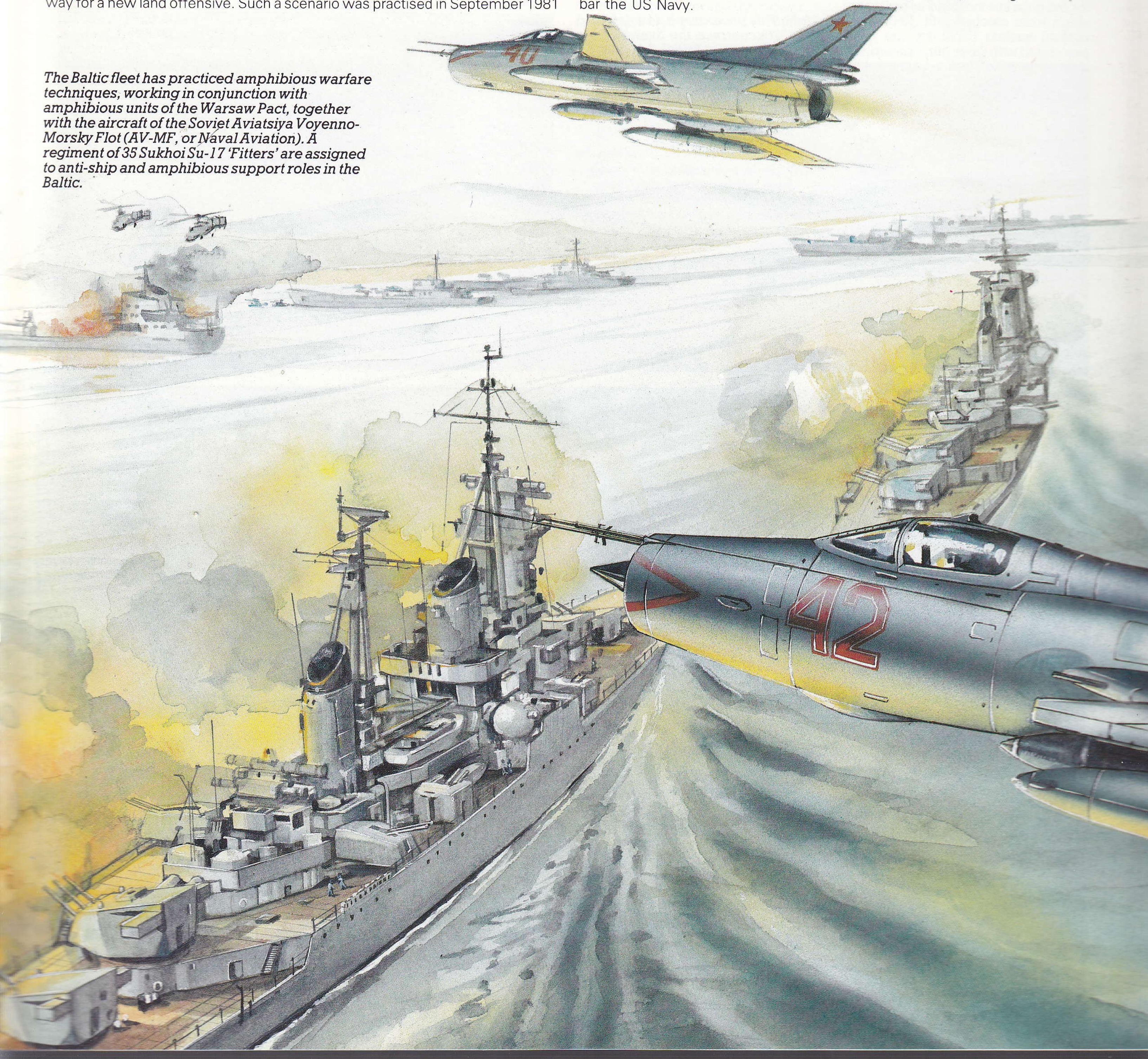
As in the case of the Royal Navy in the Falklands, the majority of the air and shore bombardment fire will be under the direct radio control of specialist Naval Infantry NGS forward observers and Spetsnaz special forces teams, landed covertly several days before the main landing to identify defending unit positions. With such targets neutralized the chances of a successful landing, which are essentially dependent on securing the beach-head and rapidly building up the forces on it, become much greater.

In the case of an attack on a port the Naval Infantry will almost certainly be landed nearby to link up with airborne infantry for a combined assault. The NGS and its direction will therefore become even more crucial as its inherent accuracy will be useful in demolishing individual targets in the urban fighting phase to clear a path for the attacking units. The subsequent capture of the port will then allow the rapid disembarkation at its facilities of a large number of motorized rifle division troops from Roll-on/Roll-off (Ro-Ro) transports and other ships.

In supporting the Soviet army in the land war, two basic scenarios have been practised over the years by the amphibious warfare force. The first is amphibious landings executed in conjunction with a main army offensive. These are designed to create diversions in NATO's rear areas and to bleed off reserve units which would otherwise be committed to the main action. The other is an amphibious assault launched in an effort specifically calculated to break a stalemate on the main front by effectively turning NATO's flank and opening the way for a new land offensive. Such a scenario was practised in September 1981 during 'ZAPAD-81' in the Baltic. Approximately 100 surface ships from three Soviet fleets took part in the operation, the main landing taking place on the Lithuanian coast between Baltiysk and Palmnicken. About 6,000 Soviet Naval Infantry and motorized infantry were landed by helicopter, assault ship, air cushion vehicle and Ro-Ro merchant ships. The mission of the Naval Infantry was to secure the beach-head, clear any minefields present and to create routes through defending forces for the follow-up main landing force of motorized riflemen to exploit. In the exercise the role of NGS to help overcome defensive positions holding up the Naval Infantry was clearly demonstrated.

In 1983 the joint Warsaw Pact amphibious assault exercise 'SOYUZ-83' in the Baltic was given extensive coverage in the press of several Eastern bloc nations. The first phase was the clearing of offshore minefields by a minesweeper group and the saturation of the beach defences by NGS from two 'Sverdlov' class cruisers and supporting Naval Air Force Sukhoi Su-20 'Fitter-C/D' fighter-bombers. The main assault in three waves then went in, under cover of additional air support, in the wake of an initial echelon of Naval Infantry and Polish Blue Berets using helicopters and landing craft. The main group was screened in its approach by a helicopter-originated smoke screen.

In all the Warsaw Pact amphibious warfare exercises to date in the Baltic the role of NGS has been emphasized, so much so that the Soviet navy instigated a major refit programme for a number of its 'Sverdlov' class cruisers to ensure that they serve on well into the next decade as the primary NGS ships of the four Soviet fleets. Within NATO circles this factor has generally been ignored by all bar the US Navy.



The Baltic fleet has practiced amphibious warfare techniques, working in conjunction with amphibious units of the Warsaw Pact, together with the aircraft of the Soviet Aviatsiya Voyenno-Morsky Flot (AV-MF, or Naval Aviation). A regiment of 35 Sukhoi Su-17 'Fitters' are assigned to anti-ship and amphibious support roles in the Baltic.

USSR

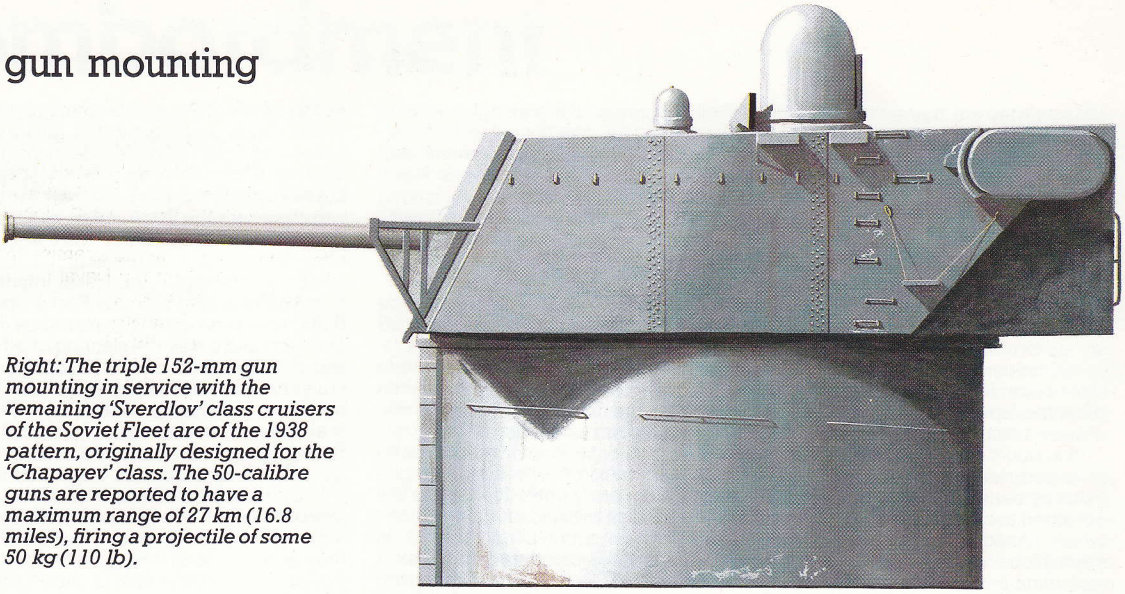
152-mm triple gun mounting

The Soviet navy's 50-calibre **152-mm triple mounting** features the largest naval guns in service today with any navy save that of the USA. The guns are of a 1938 design, and are fitted on the unmodified 'Sverdlov' class cruisers in a conventional two forward and two aft turret arrangement. The barrels can be individually elevated, loaded and fired if required. The loading phase is believed to be semi-automatic in nature, each barrel having a maximum rate of fire of 10 rounds per minute, though a more practical rate is thought to be 4-5 rounds per minute. The guns also have a limited anti-aircraft capability using barrage fire. At the rear of each turret top is installed an 8-m (26.25-ft) long optical rangefinder, whilst for radar fire-control purposes the turrets usually mount an 'Egg Cup' E-band ranging only radar. An additional two 'Top Bow' fire-control radars for the guns are included as part of the ship's main electronic fit. Recently a tactical nuclear capability has been associated with these guns, possibly as a direct result of its naval gunfire support role in Warsaw Pact amphibious assault operations.

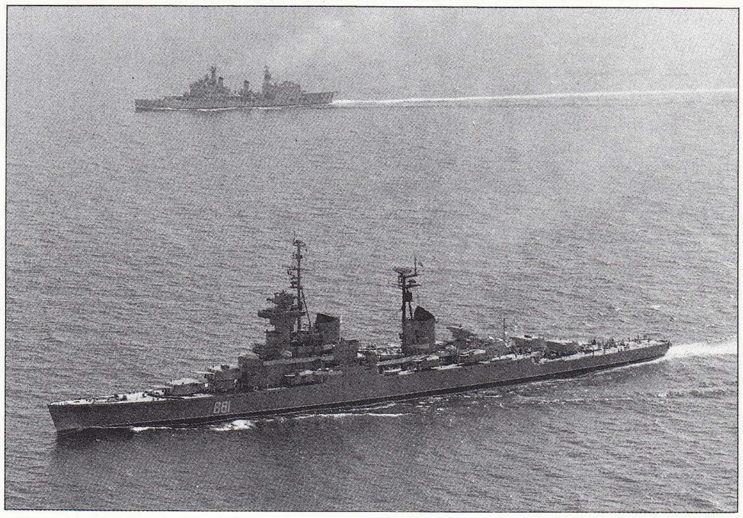
The only other country to use this gun was Indonesia, which had the weapon aboard a 'Sverdlov' class cruiser which has now been scrapped.

Specification

152-mm triple gun mounting
Calibre: 152 mm (5.98 in)
No. of barrels: three
Weight: not known
Elevation: −5° to +50°
Muzzle velocity: 915 m (3,002 ft) per second
Projectile weight: 50 kg (110.2 lb)
Maximum rate of fire: 30 rpm
Effective ranges: surface fire 18 km (11.2 miles), and anti-aircraft fire 12 km (7.5 miles)



Right: The triple 152-mm gun mounting in service with the remaining 'Sverdlov' class cruisers of the Soviet Fleet are of the 1938 pattern, originally designed for the 'Chapayev' class. The 50-calibre guns are reported to have a maximum range of 27 km (16.8 miles), firing a projectile of some 50 kg (110 lb).



Right: This photograph dating from the 1970s contrasts the 'Sverdlov' class with the last British 6-in gun cruiser. The Soviet ship remains to all intents and purposes an unmodified World War II type, while HMS Blake *bears little resemblance to any wartime forebears.*

Below: Dzerzhinsky *was altered in the early 1960s, being fitted with an SA-N-2 launcher in place of its X-turret. Presumably the conversion was not a great success, as no other 'Sverdlov' was so converted. Although potentially fine NGS ships, the 'Sverdlovs' remain vulnerable to modern weaponry and, since there is no sign of the Soviet navy updating their missile defences by the addition of close-in weapon systems, it may be that these large, impressive vessels are being retained as training ships and 'flag-showers'.*

ITALY

76-mm OTO Melara Compact gun

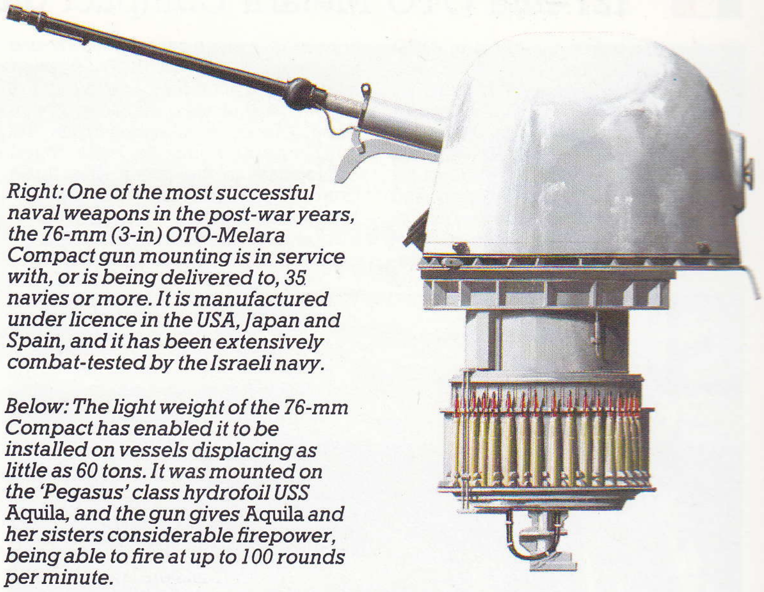
The 62-calibre **76-mm OTO Melara Compact** gun is now the most famous lightweight dual-purpose naval gun in the world. Developed from the 76-mm (3-in) **OTO Melara MMI** mount in the mid-1960s the gun first entered service in 1969 as a system intended for installation in ships of any size and class down to motor gunboats and hydrofoils. The fully automatic mounting consists of two parts, the shank and the turret assembly. The former is installed below deck and contains the 80-round rotating platform and hoist ammunition feed system to the gun in the turret above. This is covered by a watertight and NBC proof fibreglass shield. The only manpower required is in the main magazine, where ammunition handlers are needed to feed the drum in order to keep it loaded. The rate of fire is adjustable from a minimum of 10 to a maximum of 85 rounds per minute, although a new **Super Rapid** variant increases the latter to 100+ rounds per minute. The rate is adjusted on the operations room control console. Another option available is the ability to fit a stabilized line of sight local fire-control system if required.

The gun barrel is fitted with a muzzle brake and a fume extractor. Currently the gun is in service or on order with some 37 navies, and is being licence-built in the USA, Japan and Spain. The Israeli navy has used the weapon extensively in combat in the anti-ship and shore bombardment roles. It is believed that the Israelis have modified the gun for use in the latter role, possibly with locally produced ammunition.

A more modern variant with an autonomous turret-mounted Lince gun director and new prefragmented ammunition, for use against sea-skimming missiles, has been developed by the Italians for production in the next year or so.

Specification

76-mm OTO Melara Compact
Calibre: 76 mm (3 in)
No. of barrels: one
Weight: 7.35 tons
Elevation: −15° to +85°
Muzzle velocity: 925 m (3,035 ft) per second
Projectile weight: 6.3 kg (13.9 lb)
Maximum rate of fire: 85-100 rpm (according to variant)
Maximum effective ranges: surface fire 8 km (5 miles), and anti-aircraft fire 5 km (3.1 miles)



Right: One of the most successful naval weapons in the post-war years, the 76-mm (3-in) OTO-Melara Compact gun mounting is in service with, or is being delivered to, 35 navies or more. It is manufactured under licence in the USA, Japan and Spain, and it has been extensively combat-tested by the Israeli navy.

Below: The light weight of the 76-mm Compact has enabled it to be installed on vessels displacing as little as 60 tons. It was mounted on the 'Pegasus' class hydrofoil USS Aquila, and the gun gives Aquila and her sisters considerable firepower, being able to fire at up to 100 rounds per minute.

Below: With more than 60 built or projected, the US 'FFG-7' class is one of the most numerous frigate designs since the war. Unusually, the design placed the sole gun, a licence-built OTO-Melara Compact 76-mm, high up amidships. This is less than effective against sea-skimming missiles.

ITALY

127-mm OTO Melara Compact gun

Design work for the **127-mm OTO Melara Compact** 54-calibre gun started in 1965 as a joint venture by OTO Melara with the Italian government. The first prototype was completed in May 1969 and the gun was adopted as the main armament for new-build Italian navy frigates and destroyers. The loading, ammunition, feeding and firing sequences are controlled by one man in the ship's operations room using a console. Ready-use ammunition is held in three 22-round loading drums below deck under the mount. This allows a choice between three different ammunition types, the gun's operator choosing the round appropriate to the action. The three drums are automatically reloaded via two hoists that are manually replenished in the main magazine. A drum can be reloaded even whilst the gun is firing. The barrel itself is fitted with a muzzle brake. Apart from Italy the navies of Argentina, Canada, Iraq, Nigeria, Peru and Venezuela have guns of this type in service aboard frigates and destroyers.

Specification

127-mm OTO Melara Compact

Calibre: 127 mm (5 in)

No. of barrels: one

Weight: 34 tons

Elevation: −15° to +85°

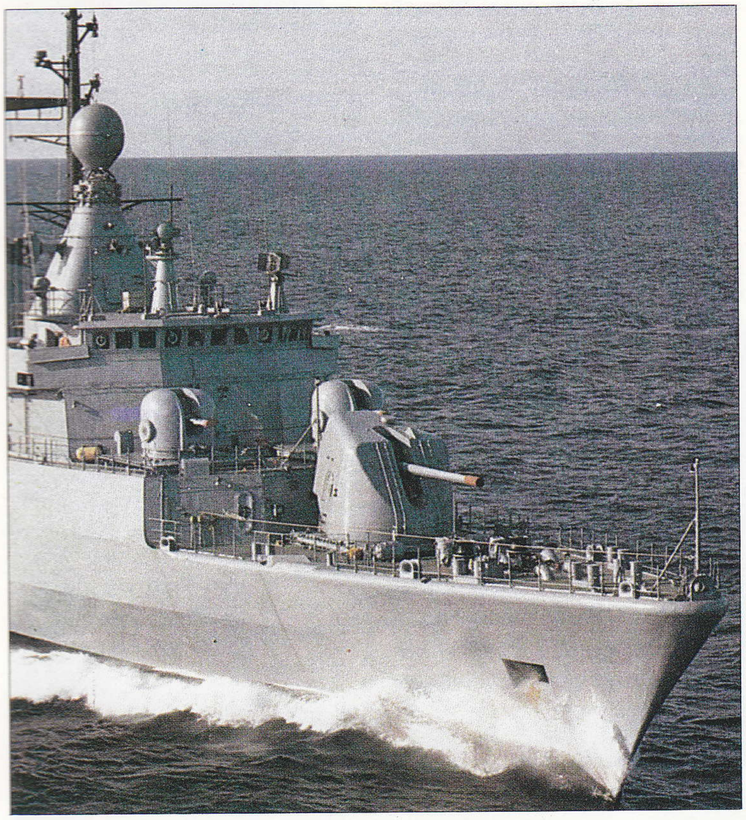
Muzzle velocity: 807 m (2,648 ft) per second

Projectile weight: unknown

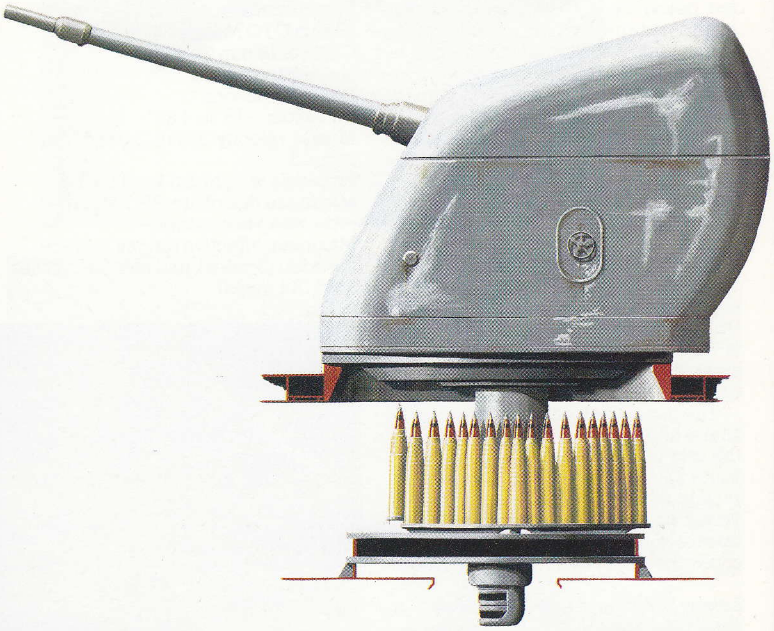
Total round weight: 32 kg (70.5 lb)

Maximum rate of fire: 45 rpm

Maximum effective ranges: surface fire 15 km (9.3 miles), and anti-aircraft fire 7 km (4.3 miles)



Left: OTO-Melara developed a compact, lightweight 127-mm (5-in) gun and turret for use as the main armament for frigates and destroyers. Blohm und Voss have adopted the gun for their 'Meko 360' class of destroyer, as seen here on Argentina's Almirante Brown.



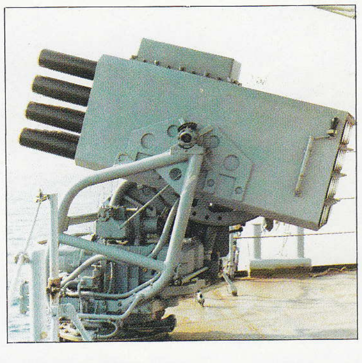
Above: The major technical features of modern compact systems are the major use of light alloy structures, lightweight control mechanisms, and a higher rate of fire. This last feature requires an automatic loading sequence, with ready-use rounds close to hand and easily refillable.

ITALY

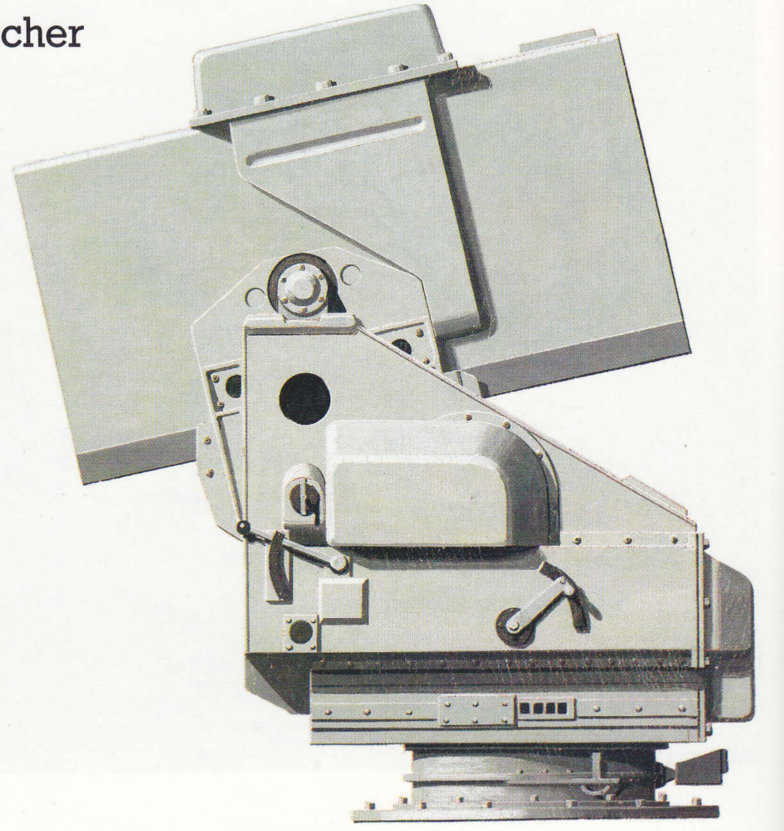
105-mm Breda SCLAR rocket-launcher

The **105-mm Breda SCLAR** naval rocket-launcher system normally consists of two 20-tube launchers for 105-mm (4.13-in) countermeasures or assault rockets, an Elsag fire-control unit and a magazine filled with SNIA rockets. The two launchers are mounted one on each side of the ship so that they provide as wide a coverage as possible. A remote-control facility on the fire-control unit allows them to be automatically trained and elevated to respond to any incoming threats detected by the ship's own ESM sensors. To meet any threat, mixed rocket type salvoes can be loaded into the launcher tubes, automatic selection of the type, fuse setting and launch sequence being undertaken by the operator on the remote fire-control console. If necessary the countermeasures rockets can be offloaded and replaced by a variant fitted with HE warheads for shore bombardment and defence suppression purposes.

About 1,000 SCLAR mountings have been built to date for the navies of Argentina, Ecuador, Iraq, Italy, Nigeria, Peru, Venezuela and West Germany. The other rocket types used include the 105LR-C long-range (up to 12 km/7.5 miles) chaff distraction, the 105MR-C medium-range (up to 5 km/



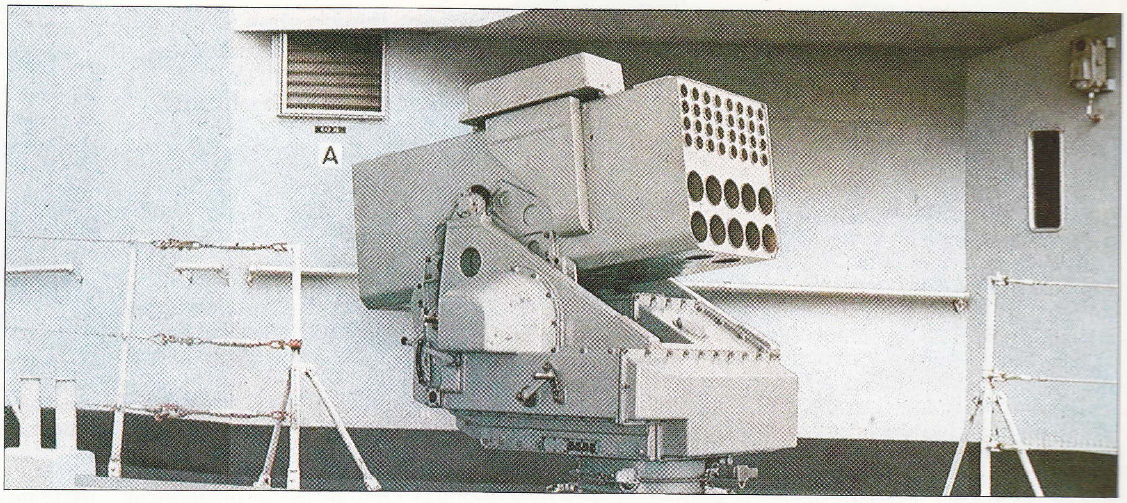
Above: The Breda 105-mm rocket-launcher is usually fitted to a ship as one of a pair, primarily for use as a launch system for countermeasures; high explosive warheads can be fitted for assault purposes.



Right: Developed from the 105-mm launcher, the multi-calibre assault launcher fires both 105-mm and 51-mm rockets. The servos of the training mechanisms are more carefully protected against adverse weather conditions than in the original system.

3.1 miles) chaff seduction and the 105LR-I illuminating with a maximum range of 4 km (2.5 miles).

Specification
SCLAR
Calibre: 105 mm (4.13 in)
No. of tubes per launcher: 20
Weight: 1.72 tons
Elevation: −5° to +60°
Rate of fire: 1 rocket per second
Rocket types: HE, chaff, illumination
Maximum range: 4-12 km (2.5-7.5 miles)

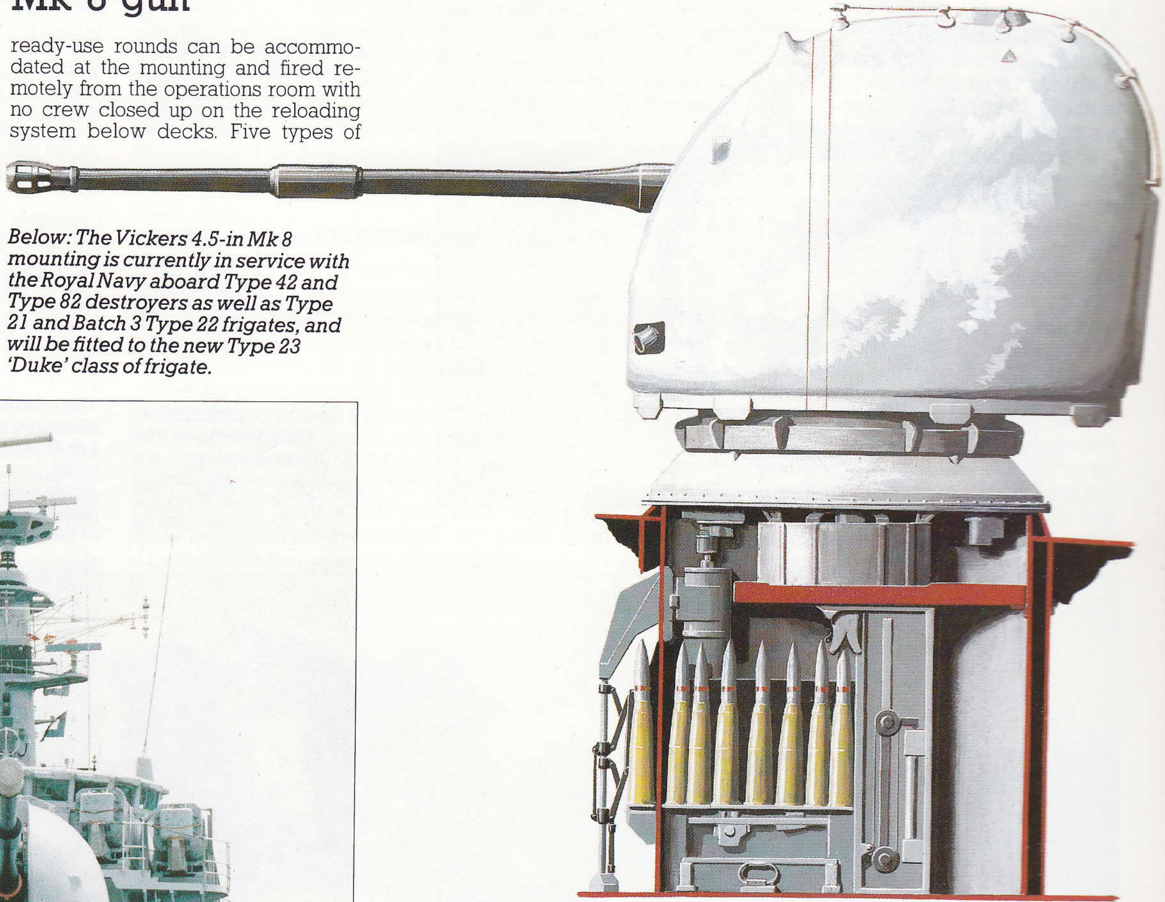


Seen aboard a 'Lupo' class frigate of the Italian navy, the Breda multi-calibre assault launcher retains the capacity to fire deception and countermeasure rockets from the 105-mm tubes. The 51-mm rockets are strictly for close range assault, however.

UK

Vickers 4.5-in Mk 8 gun

The Royal Navy has been using the 114-mm (4.5-in) weapon as its standard medium calibre gun since World War II. In the mid-1960s RARDE began design development of a fully automatic version to replace the semi-automatic Mk 6 twin turret. Based on the British army's Abbot gun, the radar-controlled **4.5-in Mk 8** gun, as it became known, is a 55-calibre weapon fitted with a muzzle brake and fume extractor. The gun mounting itself is designed by Vickers and features a reinforced GRP gun shield with a simple ammunition feed system and remote power controls. A stockpile of ready-use rounds can be accommodated at the mounting and fired remotely from the operations room with no crew closed up on the reloading system below decks. Five types of fixed ammunition can be fired: chaff, surface practice, anti-aircraft practice HE (with impact, close proximity, distant proximity or delay-action fuses) and illuminating. Apart from the Royal Navy the Mk 8 is in service with the Argentine, Brazilian, Iranian, Libyan and Thai navies. The Mk 8 saw extensive combat service in the 1982 Falklands war, mainly in the shore bombardment and close-support roles for troops in contact with the enemy, but it is also credited with destruction of an Argentine supply ship when HMS *Alacrity* sank the *Isla de los Estados*.



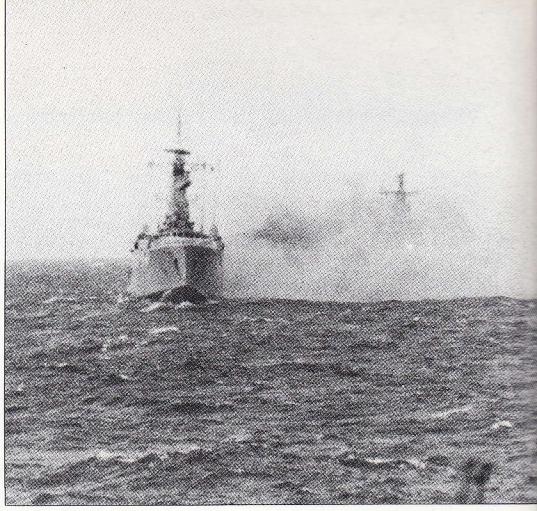
With a maximum range of 23 km (14.3 miles) and a sustained rate of fire of 25 rounds per minute, the Mk 8 can fire a variety of differing rounds, including high explosive with four different types of fuse (impact, close proximity, distant proximity and delayed action).

Below: The Vickers 4.5-in Mk 8 mounting is currently in service with the Royal Navy aboard Type 42 and Type 82 destroyers as well as Type 21 and Batch 3 Type 22 frigates, and will be fitted to the new Type 23 'Duke' class of frigate.

Specification
Mk 8 gun
Calibre: 114.3 mm (4.5 in)
No. of barrels: one
Weight: not known
Elevation: −10° to +55°
Muzzle velocity: 870 m (2,854 ft) per second
Projectile weight: 21 kg (46.3 lb)
Maximum rate of fire: 25 rpm
Maximum effective ranges: surface fire 23 km (14.3 miles), and anti-aircraft fire 6 km (3.7 miles)

Falklands Firepower

With the British withdrawal from Empire in the 1960s, defence thinking has concentrated on a British role in NATO, and the Royal Navy has become a primarily anti-submarine force with an area of operation largely confined to the North Atlantic. Large-scale amphibious operations, and their attendant gunfire support, were things of the past until events in early 1982 proved otherwise.



The first major action for the gunners aboard the ships of the Task Force was the re-taking of South Georgia. In this photograph, taken from HMS Antrim, *HMS* Plymouth *bombards Argentine positions.*

The 1982 war in the Falklands should have proved to all doubters that the fitting of medium guns aboard Royal Navy warships is still a vital necessity even in an age of high technology. The 114-mm (4.5-in) gun saw service in two forms, the twin semi-automatic Mk 6 and the single Mk 8. Both became one of the Task Force's main weapons for bombarding Argentine positions throughout the Falkland Islands.

The Naval Gunfire Support (NGS) provided was well suited to engaging pinpoint targets, naval guns having high muzzle velocity and, hence, flat trajectory. The 105-mm (4.1-in) gun/howitzers ashore, sited in batteries and with lower muzzle velocity, had a greater spread of fire but a lower rate of fire. For instance, the Mk 6 turret can fire a 25-kg (55-lb) shell to about 16.4 km (18,000 yards) at a rate of some 30 rounds a minute, while the fully automatic Mk 8 is able to shoot 21-kg (46.3-lb) shells to a range of about 23 km (32,340 yards) at up to 25 rounds a minute. By comparison, a 105-mm light gun with a competent and fit crew can only hope to maintain a sustained rate of fire of about five rounds a minute over a prolonged bombardment. The ballistic characteritics of the naval guns thus made them more suitable for engaging point targets such as enemy gun positions, buildings and field works with substantial overhead cover. The computer-directed Mk 8 also demonstrated its ability to engage two targets simultaneously, shelling one with High Explosive while illuminating another with starshell. The automatic control speeded up the time of response from the time the ship received the target co-ordinates over the Naval Gunfire Control radio net to the moment at which the first rounds landed. Programming of the computer with a number of target co-ordinates also allowed immediate engagement if a hurried repeat-mission call came. The only disadvantage of the automatic Mk 8 is that the success of the bombardment is entrusted to only a single weapon. High technology is by no means immune to Murphy's Law: HMS *Arrow* was providing vital support for 2 Para's attack on Goose Green when the gun broke down, silencing her for two hours.

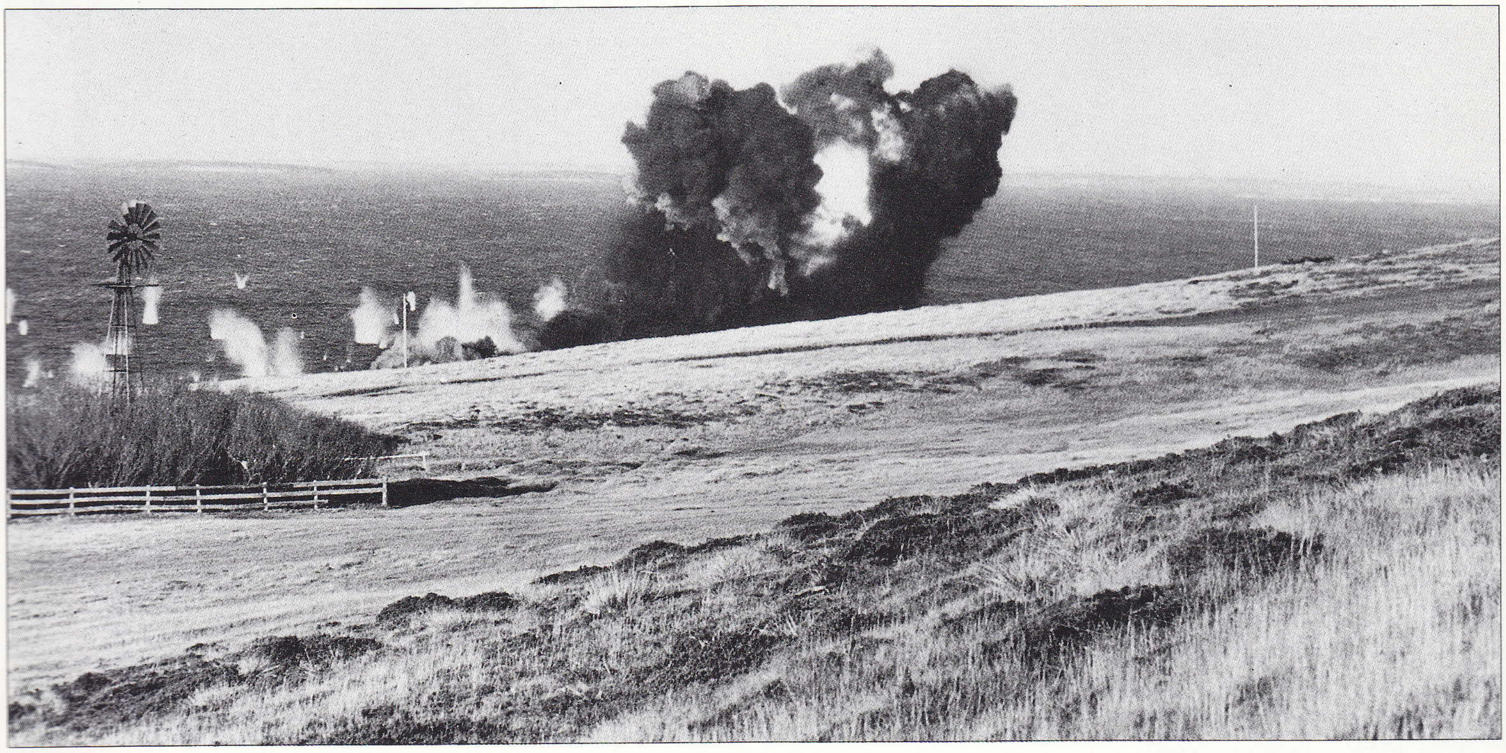
To provide the target co-ordinates for the guns the Task Force ships used 148 Commando Forward Observation Battery, Royal Artillery. This forward observation unit is equipped with HF radios and is trained to be put ashore in five-man Naval Gunfire Support Forward Observer (NGSFO) teams by boat, submarine, parachute or helicopter several days before an amphibious assault. If required, it then remains around the target to direct the fire. Of the five teams used in the Falklands from 148 Battery one was assigned to the 3rd Commando Brigade, another to the 5th Infantry Brigade and the others to the various Special Forces units which roved over the islands on reconnaissance and raiding missions.

Firepower demonstration

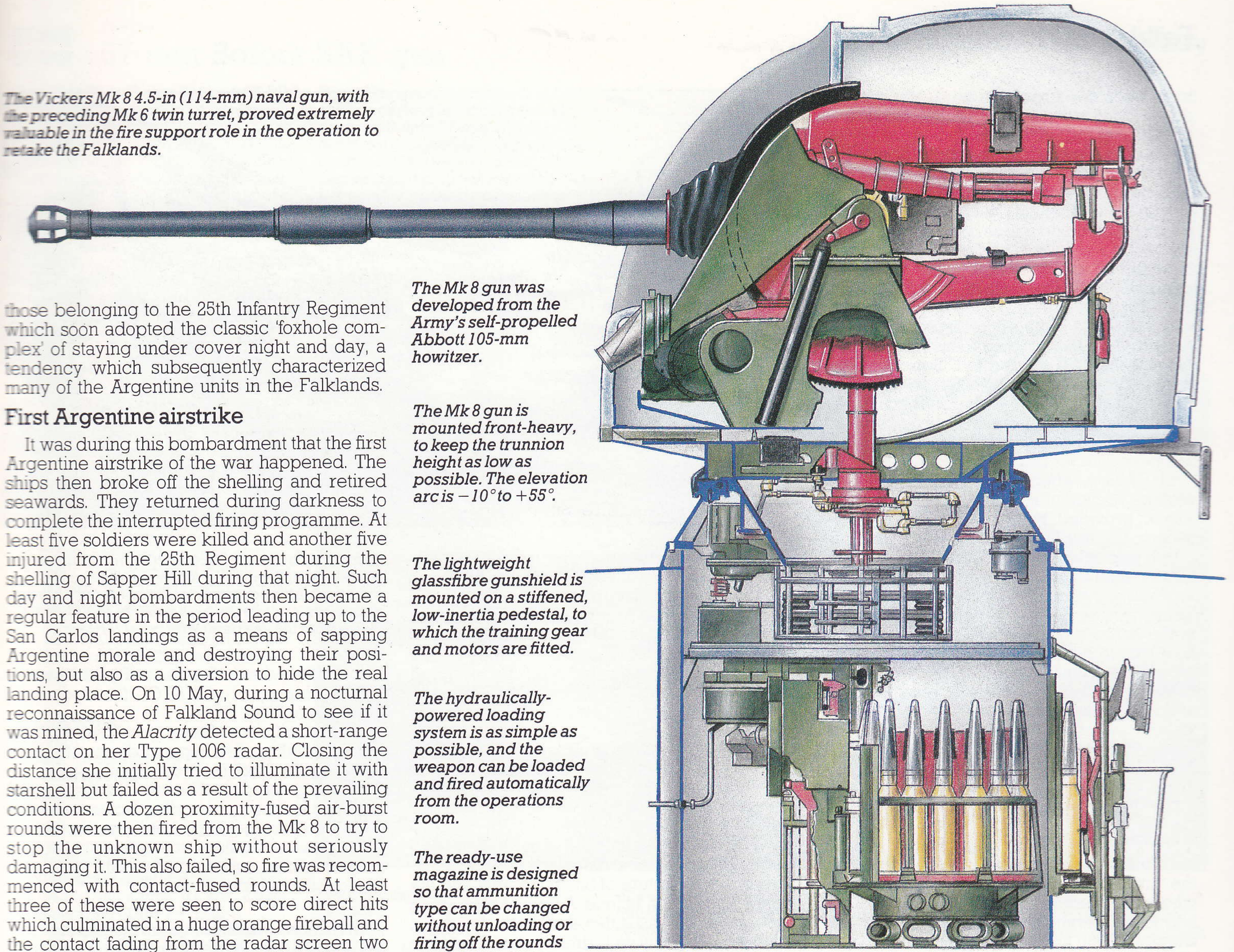
The first combat use of the 114-mm guns came when the destroyer HMS *Antrim* and the frigate HMS *Plymouth* used their Mk 6 mounts in a firepower demonstration to frighten the Argentine defenders of Grytviken on South Georgia. On 25 April, under the direction of two Royal Artillery observers helicoptered ashore earlier by a Westland Wasp, the ships fired 235 shells whilst a joint SAS/Royal Marines assault force was landed by helicopter to recapture the place. This they did without a shot being fired when the Argentines surrendered after realizing their hopeless position.

The next occasion when the guns fired in anger was on 1 May following the Avro Vulcan and BAe Sea Harrier attacks on Port Stanley airfield. The destroyer HMS *Glamorgan* with a Mk 6 turret and the 'Type 21' frigates HMS *Arrow* and *Alacrity* formed a surface bombardment group. Steering to a gunline position located some 10975 to 15360 m (12,000 to 16,800 yards) off Stanley, they engaged six targets: the aircraft parking apron on the airfield, the road from the airfield to Stanley, and the suspected positions to the north and south of the field where coastal guns and radar were thought to be located. The first shell was fired by the *Arrow*, the fire of all three ships being corrected by NGS observers aboard several helicopters. The main Argentine positions hit were

The epic battle at Goose Green saw HMS Arrow *allocated the gunfire support role. Unable to fire her weapon because of a fault, she was able to shell Argentine positions only when a rating held down a switch in the turret with his finger! She then performed well, shelling Darwin in the early stage of the attack. A shell can be seen exploding there*



The Vickers Mk 8 4.5-in (114-mm) naval gun, with the preceding Mk 6 twin turret, proved extremely valuable in the fire support role in the operation to retake the Falklands.



The Mk 8 gun was developed from the Army's self-propelled Abbott 105-mm howitzer.

The Mk 8 gun is mounted front-heavy, to keep the trunnion height as low as possible. The elevation arc is −10° to +55°.

The lightweight glassfibre gunshield is mounted on a stiffened, low-inertia pedestal, to which the training gear and motors are fitted.

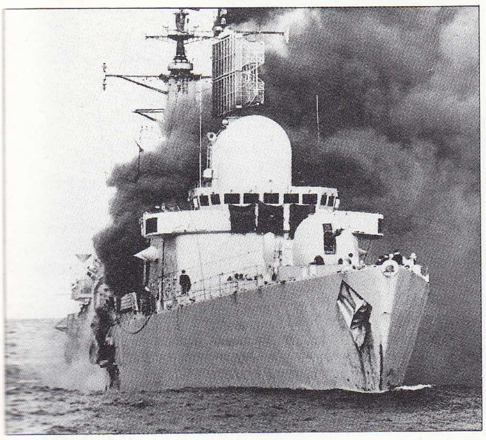
The hydraulically-powered loading system is as simple as possible, and the weapon can be loaded and fired automatically from the operations room.

The ready-use magazine is designed so that ammunition type can be changed without unloading or firing off the rounds already stocked.

those belonging to the 25th Infantry Regiment which soon adopted the classic 'foxhole complex' of staying under cover night and day, a tendency which subsequently characterized many of the Argentine units in the Falklands.

First Argentine airstrike

It was during this bombardment that the first Argentine airstrike of the war happened. The ships then broke off the shelling and retired seawards. They returned during darkness to complete the interrupted firing programme. At least five soldiers were killed and another five injured from the 25th Regiment during the shelling of Sapper Hill during that night. Such day and night bombardments then became a regular feature in the period leading up to the San Carlos landings as a means of sapping Argentine morale and destroying their positions, but also as a diversion to hide the real landing place. On 10 May, during a nocturnal reconnaissance of Falkland Sound to see if it was mined, the *Alacrity* detected a short-range contact on her Type 1006 radar. Closing the distance she initially tried to illuminate it with starshell but failed as a result of the prevailing conditions. A dozen proximity-fused air-burst rounds were then fired from the Mk 8 to try to stop the unknown ship without seriously damaging it. This also failed, so fire was recommenced with contact-fused rounds. At least three of these were seen to score direct hits which culminated in a huge orange fireball and the contact fading from the radar screen two minutes later. The target was later found to



Above: The 4.5-in gun aboard HMS Sheffield *is trained forward as she burns following the Exocet strike in her side.*

Right: The investment of Port Stanley required support from the naval guns of the Task Force, directed by Naval Gunfire Observation teams ashore, working in conjunction with the army. This observation post is occupied by the Scots Guards on Goat Ridge just before the attack on Tumbledown Mountain – the key feature overlooking Port Stanley.

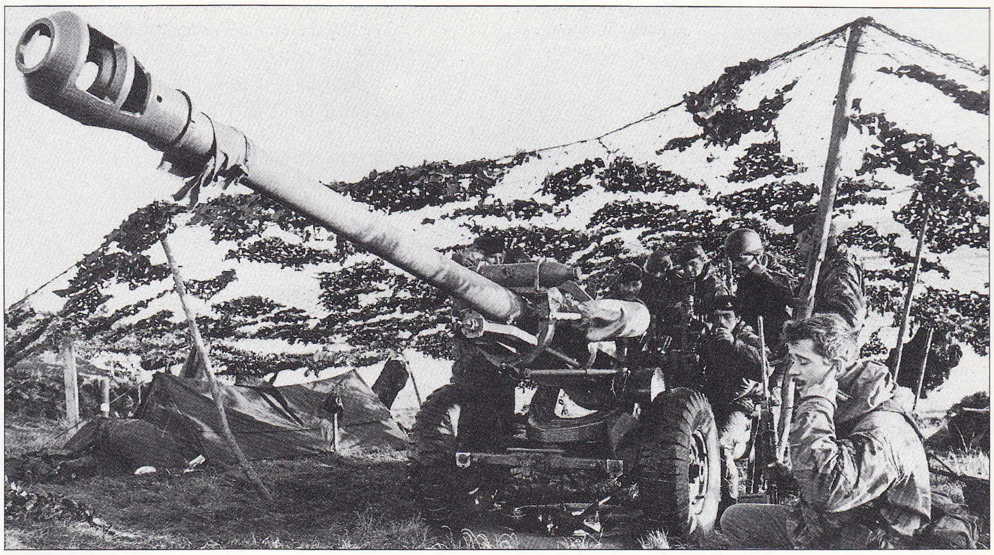
have been the Argentine naval transport *Isla de los Estados* loaded with some 325000 litres (71,490 Imp gal) of aviation fuel, military vehicles and weapons. On the night of the 16/17 May the *Alacrity* again entered the Sound to land two SBS teams and a NGSFO team covering the actual landing. On 21 May an Argentine position containing troops belonging to the 12th and 25th Regiments which threatened the beach-head was taken out by an SBS assault using NGS from the *Antrim*. At the same time the *Glamorgan* steamed into Berkeley Sound and shelled targets north of Stanley whilst HMS *Ardent* went farther down Falkland Sound to provide daytime support to D Sqn SAS, which was raiding the Darwin and Goose Green area as a diversion. As the Argentine air force reacted to the San Carlos landings so the medium guns were thrown into use as AA weapons, but scored no kills.

On 28 May, when the 2nd Battalion, The Parachute Regiment attacked Goose Green, the *Arrow* provided NGS under NGSFO control ashore, the fire from her Mk 8 gun being the rough equivalent of an additional six-gun battery of Light Guns, trebling the available artillery support provided for the paratroops. Unfortunately, as we have seen, a fault developed in the *Arrow*'s turret which resulted in a two-hour gap in her allotted firing time. However, by putting a man in the turret to hold down a broken switch she eventually resumed firing and compensated for some of the time lost by staying past the scheduled finishing period, when she was ordered back to the comparative protection of the San Carlos defences at first light.

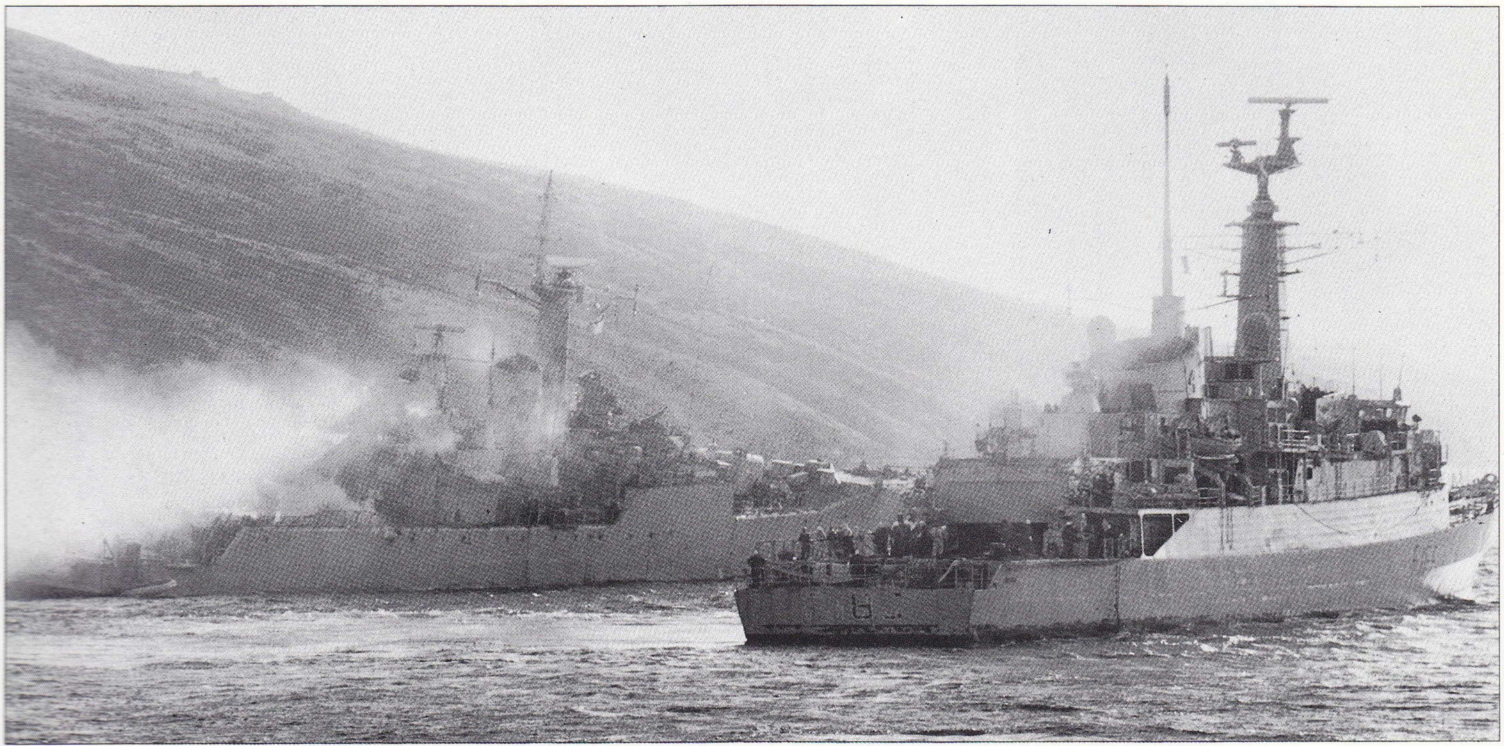
The final use of naval guns occurred during the investment of Port Stanley itself. Individual ships were assigned to support specific units during night attacks on the hills to the west of the town whilst NGSFO teams directed fire wherever possible onto Argentine targets they had found behind the actual battlefield. One example of the latter occurred during the night of 12/13 June, when ships in Berkeley Sound and under the direction of a team on Beagle Ridge to the north of Wireless Ridge fired on a series of targets. These included a radar site with dish antenna, Argentine officers' quarters, a small fuel dump on the town's racecourse and one of the elusive 155-mm (5.1-in) artillery pieces located in a gun pit to the east of Sapper Hill. All were hit, the fuel dump being destroyed and the gun overturned and its ammunition burnt.

Such bombardments showed that the continuous availability of the Royal Navy's 114-mm guns and their use under shore-based observers was a major factor in the Argentines' ultimate defeat, both mentally and physically, during the war. A total of 14 different ships carried out 63 shore bombardments on 32 days between the recapture of South Georgia and the final surrender on 14 June. Accurate supporting gunfire saves casualties and both the Royal Marines and Army units greatly benefited from the work of naval artillery during the conflict. It also showed the potential the Royal Navy has for use in support of NATO's flanks during a greater conflict.

The conclusions drawn from the successful use of naval gunfire support during the Falklands battle (and from the operations in the Lebanon going on at the same time) show that, while no longer the deciding factor at sea as it had been from the time of Drake to the Battle of Jutland, naval artillery still has a vital role to play in modern warfare, especially in support of amphibious operations.



The Royal Ordnance Factory 105-mm light gun proved complementary to the naval weapons; their mobility and spread of fire were suitable for area targets, while the high velocity and high rate of fire from the sea dealt with point targets.



HMS* Plymouth *was on her way to bombard a suspected Argentine position on West Falkland when she was hit by an air strike.

SWEDEN

57-mm Bofors SAK gun

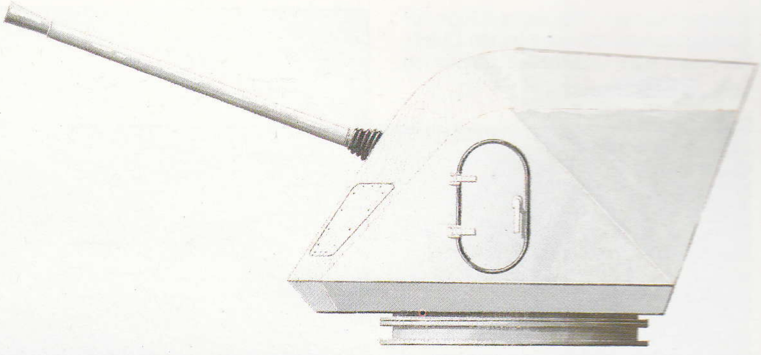
The 70-calibre **57-mm Bofors SAK Mk 1** dual-purpose gun can be used either in fully automatic remote-controlled or gyro-stabilized one-man local-control modes. The gun is housed in a plastic cupola and is designed for both surface and anti-aircraft fire. The barrel is liquid-cooled, whilst the feed system contains 40 ready-use rounds with another 128 rounds stowed in racks within the turret. The ammunition is of two types, a prefragmented round for use against aerial targets and a semi-armour-piercing round with a delay action fuse for use against surface targets. The turret can also be fitted with launching rails for 57-mm (2.24-in) illuminating rockets if required. The Mk 1 gun is in service with the navies of Sweden, Malaysia, Norway, Indonesia, Singapore, Thailand and Yugoslavia.

In the early 1980s a low-radar-signature variant, the all-purpose **57-mm Bofors SAK Mk 2**, was built. Using the same ammunition types it has a completely new automatic reloading system with 120 ready-use rounds in the cupola, and an improved electro-hydraulic remote-control system that greatly enhances the weapons accuracy against all types of targets, including sea-skimming anti-ship missiles. The Mk 2 is already in mass production for the navies of Sweden, Canada, Mexico and several unidentified countries.

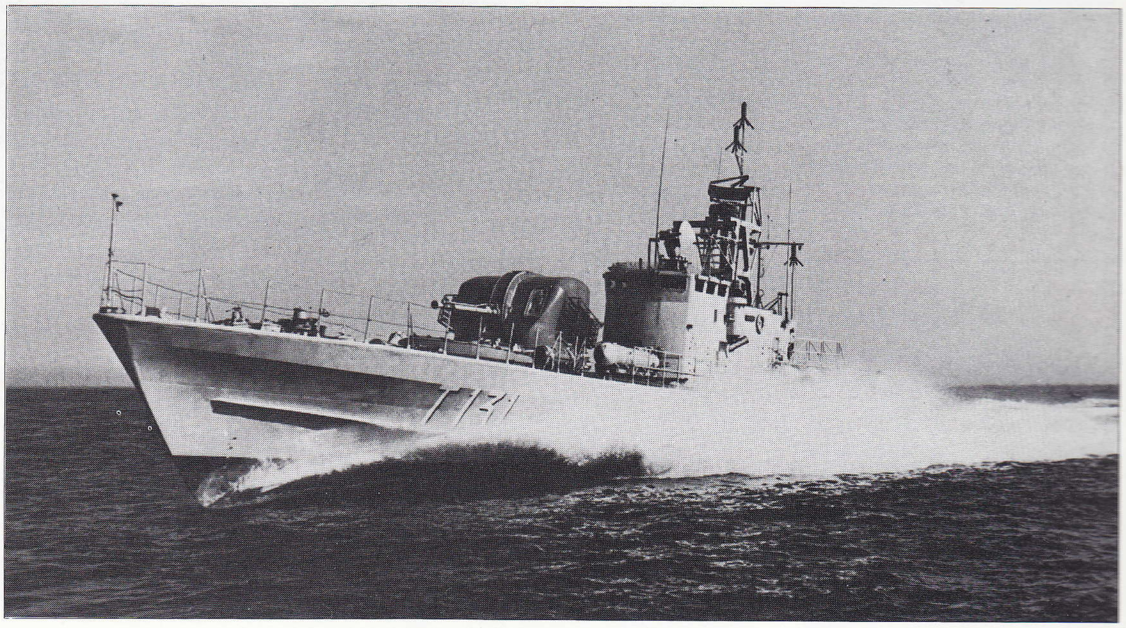
Specification

SAK Mk 1
Calibre: 57 mm (2.24 in)
No. of barrels: one
Weight: 6 tons
Elevation: −10° to +75°
Muzzle velocity: 1025 m (3,363 ft) per second
Projectile weight: 2.4 kg (5.3 lb)
Total weight of rounds: surface 6.8 kg (15 lb), and anti-aircraft 5.8 kg (12.8 lb)
Maximum rate of fire: 200 rpm
Maximum effective ranges: surface fire 13 km (8.1 miles), and anti-aircraft fire 5 km (3.1 miles)

Right: Designed for combating both surface and aerial targets, the all-purpose Bofors 57-mm SAK Mk 2 is fitted to a completely automatic fire control system and is enclosed in a compact plastic turret to provide as low a radar signature as possible.



Below: The single 57 mm L/70 automatic gun mounting fitted to the 'Spica' class fast patrol boat is equipped with rocket-launching rails for 57-mm (2-in) rockets. The elevation arc of the gun is −10° to +75°, rate of fire being as much as 200 rounds per minute.



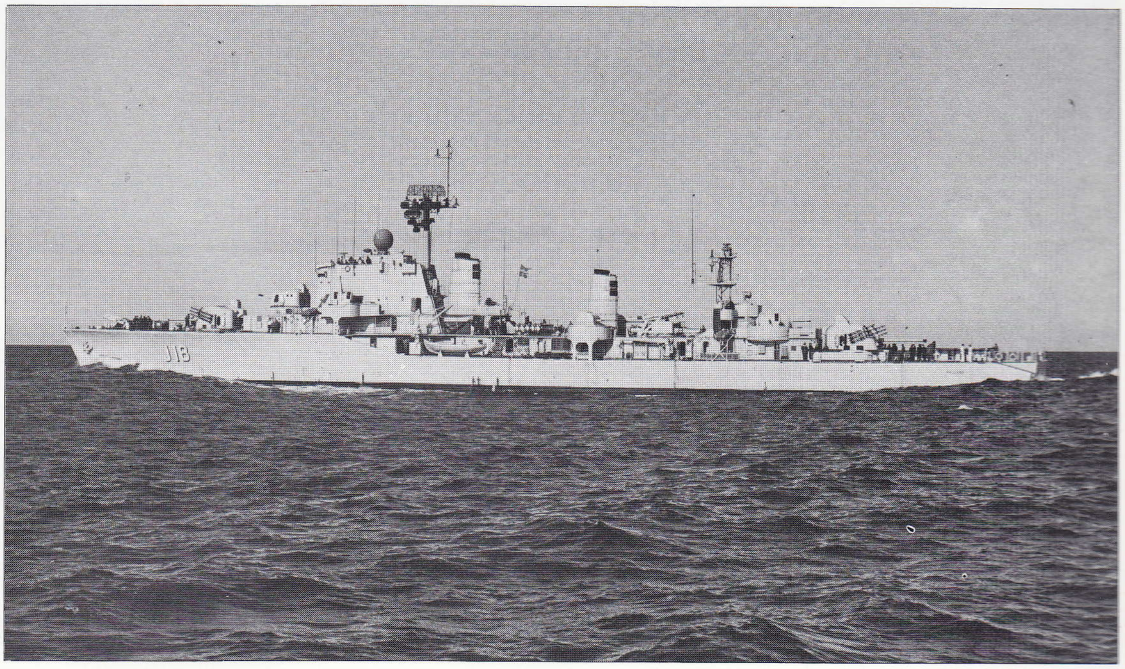
Specification

SAK Mk 2
Calibre: 57 mm (2.24 in)
No. of barrels: one
Weight: 6 tons
Elevation: −10° to +75°
Muzzle velocity: 1025 m (3,363 ft) per second
Projectile weight: 2.8 kg (6.2 lb)
Total weight of round: 6.5 kg (14.3 lb)
Maximum rate of fire: 220 rpm
Maximum effective ranges: surface fire 17 km (10.6 miles), and anti-aircraft fire 6 km (3.7 miles)

SWEDEN

120-mm Bofors gun

The **120-mm Bofors** 46-calibre automatic gun was designed for use against surface and airborne targets. Housed in a 4-mm (0.16-in) thick steel turret, the gun has two ready-use magazines mounted on the elevating cradle, and these are manually filled from a hoist system from the main magazine. The alternative to the automatic control is a gyro-stabilized one-man local control console. For this telescopic sights are fitted, whilst the hoist, elevation and traverse mechanisms can be operated by hand. The gun barrel itself has an exchangeable liner, and is water-cooled to help prolong barrel life. At present only the Finnish and Indonesian navies have the gun in service on corvette- and frigate-sized vessels respectively. The Swedish navy instead uses an older radar-controlled twin 120-mm (4.7-in) mount on its sole sur-



The first post-war destroyer design for the Swedish navy was armed with twin turrets for its 50-calibre 120-mm (4.7-in) guns. HMS Halland *is now in reserve, but the gun type is still active with the Dutch, Peruvian and Colombian navies.*

viving destroyer. The same 67-ton 50-calibre mounts are used by the Dutch, Peruvian and Colombian navies on their destroyers.

Specification

120-mm Bofors
Calibre: 120 mm (4.72 in)
No. of barrels: two
Weight: 28.5 tons
Elevation: −10° to +80°
Muzzle velocity: 800 m (2,625 ft) per second
Projectile weight: 21 kg (46.3 lb)
Total round weight: 35 kg (77.2 lb)
Maximum rate of fire: 80 rpm
Maximum effective ranges: surface fire 12 km (7.5 miles), and anti-aircraft fire 7 km (4.3 miles)

Finland's very capable 'Turunmaa' class corvettes are equipped with the Bofors single L/46 120-mm (4.7-in) gun. Fully automatic, the weapon is capable of firing some 80 21-kg (46.3-lb) shells per minute, an extremely high rate for a gun of this size.

CHINA

100-mm and 130-mm guns

In the late 1950s the People's Republic of China received the blueprints for the Soviet twin 130-mm (5.12-in) 58-calibre dual-purpose gun mounting. However, it was not until some 10 years later that the first units were produced to arm the 'Luda' class missile destroyers. The guns were built to a slightly modified design with rounded turret edges and an indigenous on-mount ranging radar. To date only the 'Luda' class have been so armed although an older Soviet single 130-mm **B-13-2C** 50-calibre weapon is used on the 'Anshan' class missile destroyers and the single refurbished ex-World War II Japanese 'Haishidate' class escort.

During the mid-1950s the Chinese also introduced into service the Soviet single **100-mm Bu-34** 56-calibre mount on its locally assembled 'Chengdu' (Soviet 'Riga' class) frigates. The design was subsequently manufactured in a modified form by the Chinese and used to arm the 'Jiangnan' and 'Jianghu I/II' series frigates and many of the refurbished ex-World War II escorts still in service. A twin-barrel variant has also been produced, and this has been fitted to the 'Jianghu III' and 'Jiandong' frigate classes. For the future the Chinese navy is known to be acquiring modern Western naval guns, and is thought to have ordered the French 100-mm (3.9-in) Compact gun for a new frigate class under construction.

Specification

100-mm Bu-34
Calibre: 100 mm (3.94 in)
No. of barrels: one
Elevation: −5° to +40°
Muzzle velocity: 875 m (2,871 ft) per second
Projectile weight: 13.5 kg (29.8 lb)
Maximum rate of fire: 15 rpm
Maximum effective ranges: surface fire 10 km (6.2 miles), and anti-aircraft fire 8 km (5 miles)

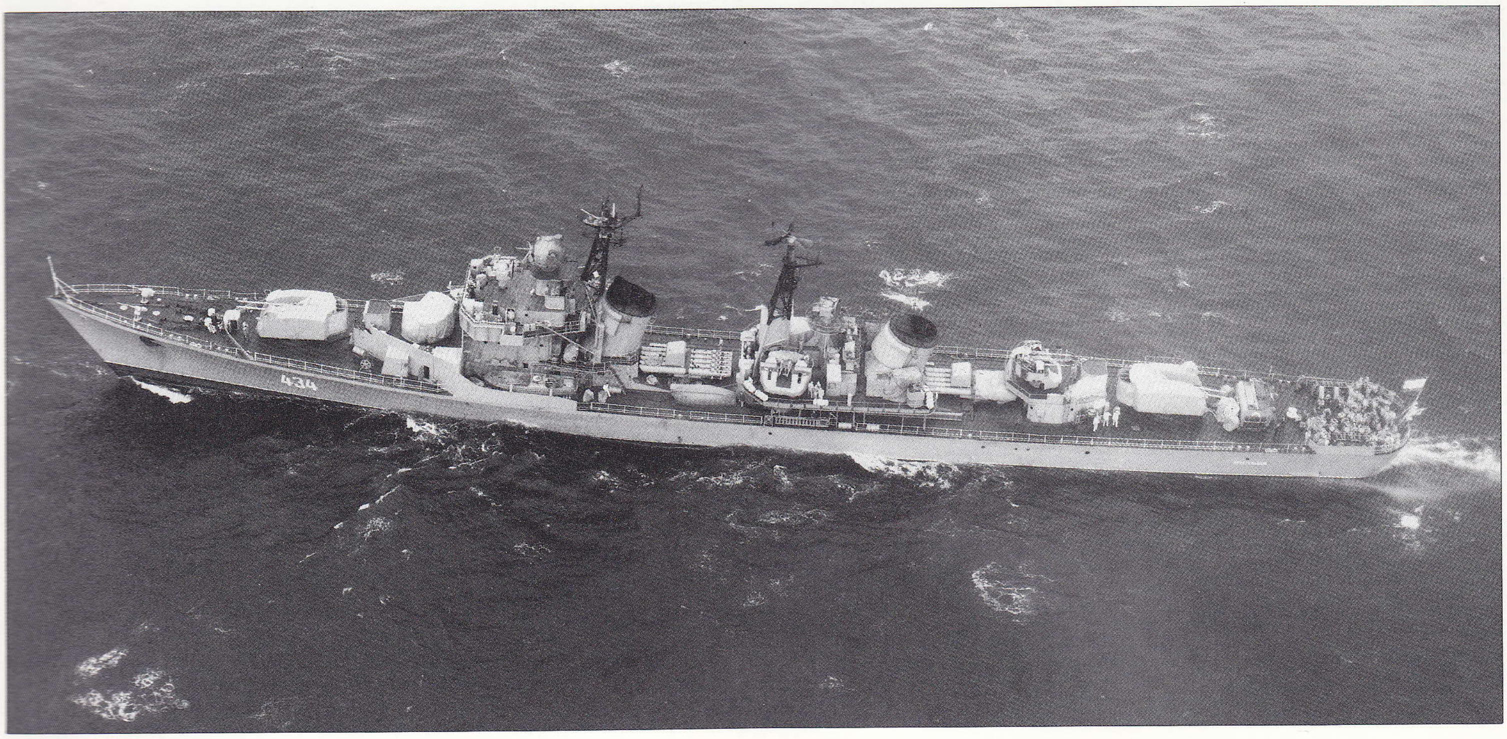
Specification

130-mm twin gun
Calibre: 130 mm (5.12 in)
No. of barrels: two
Elevation: −5° to +80°
Muzzle velocity: 945 m (3,100 ft) per second
Projectile weight: 33.4 kg (73.6 lb)
Maximum rate of fire: 20 rpm
Maximum effective ranges: surface fire 18 km (11.2 miles), and anti-aircraft fire 8 km (5 miles)

Specification

B-13-2C
Calibre: 130 mm (5.12 in)
No. of barrels: one
Elevation: −5° to +45°
Muzzle velocity: 875 m (2,871 ft) per second
Projectile weight: 27 kg (59.5 lb)
Maximum rate of fire: 12 rpm
Maximum effective range: surface fire 15 km (9.3 miles)

As with so much of their military equipment, current Chinese naval guns are modifications of Soviet designs of the 1950s, and as such are out of date.



Vietnam

The armed forces of the Socialist Republic of Vietnam have had more continuous operational experience than those of any other nation since World War II. The army alone can specifically lay claim to having 'defeated' two western armies (those of France and the USA) during this period to having 'conquered' the territories of South Vietnam in 1975 and Kampuchea in 1977, and in 1979 to have contained and pushed back a large invasion force from the People's Republic of China on its northern border. Ironically, the Vietnamese army is now embroiled in a guerrilla war inside Kampuchea and is having to use many of the tactics which the Americans used against it. As a by-product of this guerrilla conflict Vietnamese troops and armour are periodically engaging Thai troops in fierce little border battles as they try to overrun guerrilla bases on or near the border.

This inscrutable sentry outside the old palace in Ho Chi Minh city (formerly Saigon) carries a Soviet-built AK-47 assault rifle, the standard rifle of the old North Vietnamese army. Having defeated the French and Americans in turn, the Vietnamese now occupy Kampuchea.

The Army

Of the 1,000,000-strong army, some 160,000 are stationed in Kampuchea forming two Front HQs with 12 infantry divisions and support units. These support a puppet Kampuchean government army of some 30,000 against a total guerrilla force of 50-60,000 equipped mainly with mortars and recoilless rifles. There are also three infantry divisions and supporting units totalling some 40,000 men in Laos as part of Vietnam's treaty commitment to protect that country.

To aid the army in the field and to provide rear-area defence there are a number of paramilitary formations. These comprise a 60,000-man Border Defence Force; a 500,000-man People's Regional Militia organized into divisions, regiments and independent local infantry companies; a 1,000,000-strong Urban and Rural People's Self-Defence Force organized into local company-sized units; and a 1,500,000-strong Armed Youth Assault Force serving as an indoctrination organization for the youngsters of what was formerly South Vietnam.

The basic formation of the army is the infantry division, which can vary in strength according to geographic location, composition and role between 5,000 and 15,000 men. The 'average' division is considered to be about 10,500 men strong. The normal division comprises three infantry regiments each of 2,000-3,000 men, an artillery regiment, support elements and a medium tank battalion of 30 tanks. There is also a reasonably large armoured force which is slowly undergoing modernization the better to counter the threat of China to the north. A full list of the units in being includes:

16 corps HQ,
one armoured division,
10 independent armoured regiments,
56 infantry divisions,
10 marine brigades,
seven engineer divisions,
four independent engineer brigades,
15 economic reconstruction divisions (each of 3,000 men with a military and economic support role), and
five field artillery divisions (each of two or three regiments).

The 60,000-strong air-defence force which took such a heavy toll of the US Air Force and US Navy air units during their attacks on North Vietnam has continued to be built up and now fields:

four air defence artillery divisions,
40 or so independent air-defence artillery regiments,
20 SAM regiments, and
six radar brigades.

Most of the army's equipment in front-line formations is either of Soviet or Chinese origins, the second-line and paramilitary units being equipped with captured American and South Vietnamese or obsolete Soviet weapons. A limited arms industry also exists, and this manufactures some small arms and light weapons types as well as a wide range of ammunition. The industry has also been responsible for refurbishing some of Vietnam's stock of captured vehicles (such as the M113 APC) and refitting them with Soviet- or Chinese-made weapons. A portion of all the captured small arms has also passed through the factories for rebuilding before being passed on to other Soviet-backed nations and guerrilla groups. Weapons of this type have been identified in El Salvador amongst the rebels there, the serial numbers having been traced back to batches originally supplied to the South Vietnamese government. The full list of equipment known to be in service with the army is:

armour: M48, T34/85, T54, T55, T62, Type 59 and Type 62 MBTs; PT-76, M41, Type 60 and Type 63 light tanks; M8, M20 and BRDM-2 armoured cars; and BTR-40, BTR-50, BTR-60, BTR-152, Type 55, Type 56, Type 531, locally-modified V-100 Commando and M113 APCs;
artillery: (towed) 76-mm (3-in) M1942 guns, 85-mm (3.35-in) D44 guns, 100-mm (3.91-in) M1944 guns, 105-mm (4.13-in) M102 howitzers, 122-mm (4.8-in) D30 howitzers, 122-mm D74 guns, 122-mm M1931/7 guns, 122-mm M1938 howitzers, 122-mm Type 60 guns, 130-mm (5.12-in) M46 guns, 130-mm Type 59-1 guns, 152-mm (6-in) Type 66 gun howitzers, 152-mm D20 gun howitzers, 152-mm M1937 howitzers, 152-mm D1 howitzers and 155-mm (6.1-in) M114

12 PASS

The Vietnamese have adopted a wide variety of weapons in 40 years of war; here they sport PPSh41 SMGs. One of the crudest weapon designs of all times, Georgii Shpagin's 7.62-mm (0.3-in) SMG was rushed into production for the Red Army in 1941 and remains one of the simplest and most reliable guns in service.

howitzers;
(self-propelled) SU-76, SU-100, 155-mm M109 and 203-mm (8-in) M110;
(mortars) 60-mm (2.36-in) American and Chinese, 81-mm (3.19-in) American, 82-mm (3.23-in) Soviet and Chinese, 120-mm (4.72-in) Soviet and Chinese, and 160-mm (6.3-in) Soviet;

air-defence weapons: (towed) 12.7-mm (0.5-in) M53, 14.5-mm (0.57-in) ZPU-1/2/4, 23-mm ZU-23, 30-mm M53, 37-mm M1939, 40-mm M1 Bofors, 57-mm S60, 85-mm KS12, 100-mm KS-19 and 130-mm KS-30 guns;
(self-propelled) 23-mm ZSU-23-4, 57-mm ZSU-57-2, 37-mm Type 63 and 40-mm M42;
(SAM) SA-2, SA-3, SA-6, SA-7 and SA-9;

anti-tank weapons: 66-mm (2.6-in) M72 LAW, 89-mm (3.5-in) Chinese and RPG-2/7 rocket-launchers; 57-mm American and Chinese, 75-mm (2.95-in) American and Chinese, 82-mm Soviet and Chinese, 106-mm (4.17-in) American and 107-mm (4.2-in) Soviet recoilless rifles; 57-mm M1942 and 85-mm D48 ATGs; AT-3 'Sagger' and AT-5 'Spigot' ATGWs; and

small arms: various 7.62-mm (0.3-in) pistols; 7.62-mm AK47, Type 68, SKS and Dragunov automatic rifles; 5.56-mm (0.219-in) M16A1 automatic rifle; 7.62-mm Type 67, RPK, SG series, PKS, RP46, DP series and PKS LMGs, 7.62-mm M60 LMG; 7.62-mm Browning MMG; 12.7-mm DshK and Browning HMGs.

The Navy

The 12,000-man Vietnamese navy is equipped mainly with Soviet-built vessels. The vast majority of captured South Vietnamese and Chinese-supplied vessels have now been relegated to the non-operational category or scrapped because of poor condition or lack of spare parts. A large number of vessels was lost during the Vietnam War to American air power, the navy performing only a few torpedo attacks with fast attack craft in the Gulf of Tonkin, plus at least one combined 'Styx' SSM and air strike launched during the 1972 invasion of the South. The 'Styx' missile was shot down by a Terrier missile from the USS *Sterett*, whilst all the torpedo attacks were abortive and usually resulted in the loss of most of the attacking units.

The current operational strength of the navy is believed to be:

frigates: four 'Petya II' class, one ex-USCG 'Barnegat' class and one ex-US 'Savage' class;

light forces: eight 'Osa II' missile boats, 16 'Shershen' fast attack torpedo craft, eight 'SO-1' large patrol craft, 11 ex-US 'PGM59' and seven ex-US 'PGM71' large patrol craft, six 'Zhuk' class coastal patrol boats, 10 'PO-2' class coastal patrol boats and five 'K8' coastal patrol boats;

mine warfare vessels: one 'Yurka' ocean minesweeper and one 'Yevgenya' coastal minehunter;

amphibious warfare vessels: three LSTs, six LSMs and 12 LCUs; and

support ships: around 750 of all types including some 400 or so nonoperational vessels and 150 armed junks.

The Air Force

The Vietnamese air force has some 380 fairly modern combat aircraft and 40 armed helicopters in service, with several hundred older aircraft in long-term storage as war stocks. As with the other services, most of the equipment is now Soviet-supplied, some of the latest types being received as part-payment for the loan of the ex-American base at Cam Ranh Bay as a naval port and air base for Soviet Tupolev Tu-16 'Badger' bombers, Tu-142 'Bear' and 'Badger' reconnaissance aircraft, Ilyushin Il-38 'May' ASW platforms and MiG-23 'Flogger' fighters.

To train the pilots of the Vietnamese air force and to 'advise' in combat situations there are personnel from East Germany, Czechoslovakia, North Korea and the USSR. The large stocks of aircraft captured when South Vietnam fell have now largely been scrapped as a result of obvious serviceability problems. Except for several ground-attack and fighter squadrons (with helicopter gunship support), all air units are stationed in Vietnam, primarily in a defensive posture against any further incursions from China. The other units are used in Kampuchea to fly missions in the guerrilla war there. The main strike element comprises three ground-attack regiments organized along Soviet lines. They fly some 90 MiG-17 'Frescoes' and 60 Sukhoi Su-7/20/22 'Fitters'. One of the four interceptor/fighter regiments has been re-equipped with 50 or so MiG-23 'Flogger-Fs', whilst the remaining three have some 180 MiG-21 'Fishbed-D/F/J' second-generation and MiG-21 'Fishbed-N' third-generation fighters. All the aircraft carry the AA-2 'Atoll' air-to-air missile in its various marks.

The transport fleet is quite varied, and is divided into some five regiments which fly about 155 aircraft. Of these the most important numerically are the 20 Antonov An-2 'Colts', the 20 Lisunov Li-2 'Cabs' and 50 An-26 'Curls'. Heavy multi-engine aircraft are soon expected to provide a long-range assault and resupply capability to threaten neighbouring countries as required.

Helicopter support is gradually edging towards the airmobile concept that was applied in the Vietnam War by the USA, with three regiments flying 25 Mil Mi-6 'Hook', 40 Mi-8 'Hip' and 45 Bell UH-1B/H transport helicopters, with 25 Mi-24 'Hind' gunships and 15 Kamov Ka-25 'Hormone' ASW helicopters.

A minimal training force of some four regiments flies 66 Aero Delfin, Aero L-39 Albatros, MiG-17 and MiG-21 trainers to convert trainee pilots who have already undergone their primary and basic training in various Warsaw Pact countries.